BJC-240

SERVICE MANUAL

Canon

Application

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CANON INC.
BJ Products Quality Support Dept.
16-1, Shimonoge 3-chome, Takatsu-ku, Kawasaki-shi, Kanagawa 213, Japan

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I. ABOUT THIS MANUAL

This manual is divided into five sections, and contains information required for servicing the printer.

Part 1: Safety and Precautions

This section tells you how to service the printer safely. It is very important, so please read it.

Part 2: Product Specifications

This section explains the product outlines and specification.

Part 3: Operating Instructions

This section explains how to operate the printer properly. Information required about installation and service made.

Part 4: Technical Reference

This section outlines the way the printer operates so you can understand it technically.

Part 5: Maintenance

This section explains how to maintain the printer. Descriptions of assembly/disassembly, adjustment for assembly, troubleshooting procedures, and circuit diagrams are given.

Procedures for assembly/disassembly are not given in this manual. See the illustrations in the separate Parts Catalog.

II. TABLE OF CONTENTS

Page	
	Part 1: Safety and Precautions
1 - 1	1. PERSONAL SAFETY PRECAUTIONS
1 - 1	1.1 Moving and Rotating Parts
1 - 2	1.2 Ink Stains
1 - 2	1.2.1 Ink path
1 - 3	1.2.2 Ink mist
1 - 4	2. MACHINE PRECAUTIONS
1 - 4	2.1 BJ Cartridge Handling
1 - 4	2.1.1 Unpacking the BJ cartridge
1 - 4	2.1.2 BJ cartridge protection
1 - 5	2.1.3 Power on/off
1 - 5	2.1.4 When not using the printer
1 - 5	2.1.5 Ink electroconductivity
1 - 6	2.2 Printer Handling
1 - 6	2.2.1 Spur deformation precaution
1 - 6	2.2.2 Precations to prevent damage from static electricity
1 - 7	2.2.3 Ink leakage precautions
1 - 8	3. PRECAUTIONS FOR SERVICING
1 - 8	3.1 Precautions Concerning the Memory Data
1 - 9	3.2 Static Electricity Precautions
1 -10	3.3 Disassembly/Reassembly Precautions
1 -10	3.4 Built-in Self-diagnostic Functions
	Part 2: Product Specifications
2 - 1	1. PRODUCT OUTLINE
2 - 1	1.1 Product Outline
2 - 3	1.2 Features
2 - 4	1.3 BJ Cartridge
2 - 4	1.3.1 Color BJ cartridge
2 - 4	1.3.2 Black BJ cartridge
2 - 5	1.4 BJ Cartridge Container
2 - 5	1.5 AC Adapter
2 - 6	1.6 Consumables
2 - 6	1.6.1 BJ cartridges (Color and black)
2 - 7	2. SPECIFICATIONS
2 - 7	2.1 General Specifications
2 -11	2.2 Paper Specifications
2 -11	2.2.1 Paper size
2 -11	2.2.2 Paper type (Recommended)
2 -11	2.2.3 Print paper
2 -12	2.2.4 Printing range
2 -13	2.3 Interface Specifications
2 -18	2.4 Character Code Tables
2 -18	2.4.1 BJ mode
2 -21	2.4.2 LQ mode
	Part 3: Operating Instructions
3 - 1	1. PRINTER SETUP
3 - 1	1.1 Equipment Check
3 - 2	1.2 Printer Dimensions
3 - 3	1.3 Setup Procedure

Page
3 - 3 1.3.1 Connecting the interface cable
3 - 3 1.3.2 Connecting the DC power cord
3 - 4 1.3.3 Installing the BJ cartridge
3 - 5 1.3.4 BJ cartridge container
3 - 6 1.4 Turning the Printer On/Off
3 - 6 1.4.1 Turning the printer on
3 - 6 1.4.2 Turning the printer off
3 - 7 1.5 Paper Settings
3 - 8 1.6 Part Names and Functions
3 -10 2. TRANSPORTING THE PRINTER
3 -10 2.1 Carrying the Printer
3 -10 2.2 Transporting the Printer
3 -11 3. PRINTER SERVICING FUNCTIONS
3 -11 3.1 Error Indications
3 -13 3.2 Function Settings
3 -13 3.2.1 Setting the default setting mode
3 -14 3.2.2 BJ setup utility program
3 -17 3.3 Cleaning the BJ Cartridge
3 -17 3.3.1 Cleaning procedure
3 -18 3.4 Self-Test Printout
3 -18 3.4.1 Demonstration print
3 -19 3.4.2 Printer status information print
3 -20 3.4.3 ASCII character print (Ripple pattern)
3 -20 3.4.4 Nozzle check pattern
3 -21 3.5 Hexadecimal Dump Test Printout
3 -22 3.6 EEPROM Reset
3 -22 3.6.1 Resetting the EEPROM
3 -23 3.6.2 Printing the EEPROM data

Part 4: Technical Reference

4 - 1 1. OVERVIEW
4 - 1 1.1 Block Diagram
4 - 2 1.2 Initialization Operation Flowchart
4 - 3 1.3 Printing Signal Flow
4 - 4 1.4 Print Drive
4 - 4 1.4.1 Printing drive control
4 - 6 1.5 Power Off Operation Flow
4 - 7 2. FIRMWARE
4 - 7 2.1 Interface
4 - 7 2.1.1 Compatible mode
4 - 8 2.1.2 Nibble mode
4 - 9 2.2 720dpi Printing/Smoothing Feature
4 - 9 2.2.1 Canon extension mode
4 - 9 2.2.2 Emulation mode
4 -10 2.3 Printing Modes
4 -10 2.3.1 Printing mode
4 -11 2.3.2 High-duty printing mode
4 -11 2.4 Optimum Printing Direction Control
4 -12 2.5 Automatic Emulation Switching
4 -13 3. PRINTER'S MECHANICAL SYSTEM
4 -13 3.1 Overview
4 -13 3.1.1 Mechanical components
4 -15 3.2 BJ Cartridge

Page
4 -15 3.2.1 Black BJ cartridge structure
4 -16 3.2.2 Color BJ cartridge structure
4 -17 3.2.3 Bubble head unit structure
4 -23 3.3 Purge Unit
4 -23 3.3.1 Purge unit functions
4 -24 3.3.2 Purge unit structure
4 -25 3.4 Carriage
4 -25 3.4.1 Carriage functions
4 -26 3.4.2 Carriage structure
4 -28 3.5 Paper Feed
4 -28 3.5.1 Outline of the paper feed
4 -29 3.5.2 Auto feed / Manual feed
4 -31 4. PRINTER ELECTRICAL SYSTEM
4 -31 4.1 Overview
4 -32 4.2 Logic Section
4 -32 4.2.1 Logic section block diagram
4 -33 4.2.2 Logic section components
4 -36 4.3 Power Supply
4 -36 4.3.1 Power supply block diagram
4 -36 4.3.2 Power supply components
4 -38 5. SENSOR FUNCTIONS
4 -38 5.1 Pick-up Roller Sensor
4 -38 5.2 Paper End Sensor
4 -38 5.3 Home Position Sensor (Purge Sensor)
4 -38 5.4 Temperature Sensor
4 -39 5.5 Waste Ink Amount Detection

Part 5: Maintenance

5 - 1 1. MAINTENANCE
5 - 1 1.1 Periodic Replacement Parts
5 - 1 1.2 Consumables
5 - 1 1.3 Periodic Maintenance
5 - 2 2. SERVICE TOOLS
5 - 2 2.1 List of Tools
5 - 3 3. APPLYING THE GREASE
5 - 4 4. DISASSEMBLY AND REASSEMBLY
5 - 4 4.1 Disassembly and Reassembly
5 - 4 4.2 Disassembly and Reassembly Cautions
5 - 4 4.2.1 Carriage guide frame installation
5 - 5 4.3 Logic Board and Waste Ink Absorber Replacement Cautions
5 - 5 4.3.1 Logic board replacement cautions
5 - 6 4.3.2 Cautions after replacing the waste ink absorber
5 - 7 5. ADJUSTMENTS
5 - 7 5.1 Adjustment Point
5 - 7 5.2 When Adjustment is Required
5 - 7 5.2.1 Required tools
5 - 8 5.3 Adjustment Procedure
5 - 8 5.3.1 Preparation
5 - 9 5.3.2 Adjustment
5 -11 6. TROUBLESHOOTING
5 -11 6.1 Troubleshooting
5 -11 6.1.1 Overview
5 -11 6.1.2 Troubleshooting cautions
5 -13 6.2 Error Condition Diagnosis
5 -13 6.2.1 Initial self check

Page
5-16 6.2.2 Error recovery
5-29 7. LOCATION & SIGNAL ASSIGNMENT
5-29 7.1 Logic Board
5-34 8. CIRCUIT DIAGRAM
5-34 8.1 Parts Layout
5-34 8.1.1 Logic board
5-37 8.2 Circuit Diagram

III. ILLUSTRATION INDEX

Page		
1 - 1	Figure 1- 1	Moving and Rotating Parts
1 - 2	Figure 1- 2	Ink Path
1 - 3	Figure 1- 3	Ink Mist
1 - 4	Figure 1- 4	Removing the BJ Cartridge Protector
1 - 4	Figure 1- 5	BJ Cartridge & Cartridge Container
1 - 6	Figure 1- 6	Spurs
1 - 6	Figure 1- 7	Contact Section of the Carriage Ribbon Cable
1 - 7	Figure 1- 8	Capping Position
1 - 9	Figure 1- 9	Printer Electronical System
1 -10	Figure 1-10	Disassembly/Assembly Precautions
1 -10	Figure 1-11	Releasing Plastic Hooks
2 - 1	Figure 2- 1	Printer Appearance
2 - 4	Figure 2- 2	Color BJ Cartridge
2 - 4	Figure 2- 3	Black BJ Cartridge
2 - 5	Figure 2- 4	BJ Cartridge Container
2 - 5	Figure 2- 5	AC Adapter
2 - 6	Figure 2- 6	Consumables
2 -12	Figure 2- 7	Printing Area
2 -12	Figure 2- 8	Printing Area (Envelope)
2 -17	Figure 2- 9	Timing Chart (Compatible Mode)
2 -17	Figure 2-10	Timing Chart (Nibble Mode)
3 - 1	Figure 3- 1	Packaging
3 - 2	Figure 3- 2	Printer Dimension
3 - 3	Figure 3- 3	Connecting the Interface Cable
3 - 3	Figure 3- 4	Connecting the DC Power Cord
3 - 4	Figure 3- 5	Removing the BJ Cartridge Protector
3 - 4	Figure 3- 6	BJ Cartridge Handling Precautions
3 - 5	Figure 3- 7	BJ Cartridge Installation
3 - 5	Figure 3- 8	BJ Cartridge Container
3 - 6	Figure 3- 9	Do not turn off the printer without pressing the POWER button first.
3 - 8	Figure 3-10	Parts Names and Their Functions-1
3 - 9	Figure 3-11	Parts Names and Their Functions-2
3 - 9	Figure 3-12	Paper-thickness Lever
3 -10	Figure 3-13	Fastening the Carriage
3 -11	Figure 3-14	Control Panel
3 -14	Figure 3-15	BJ Setup Utility Program (Sample)
3 -18	Figure 3-16	Demonstration Print (Sample)
3 -19	Figure 3-17	Printer Status Information Print (Sample)
3 -20	Figure 3-18	ASCII Character Printout (Sample)
3 -20	Figure 3-19	Nozzle Check Pattern
3 -21	Figure 3-20	Hexadecimal Dump Test Printout (Sample)
3 -23	Figure 3-21	Sample Printout of EEPROM Data
4 - 1	Figure 4- 1	Block Diagram
4 - 2	Figure 4- 2	Initialization Flowchart
4 - 3	Figure 4- 3	Printing Signal Flow
4 - 4	Figure 4- 4	Nozzle Arrangement
4 - 5	Figure 4- 5	Print Signal
4 - 6	Figure 4- 6	Power off Operation Flow
4 - 7	Figure 4- 7	Interface Timing (Compatible Mode)
4 - 8	Figure 4- 8	Interface Timing (Nibble Mode)

Page		
4 - 9	Figure 4- 9	720 dpi Printing/Smoothing Feature
4 -13	Figure 4-10	Printer Mechanical Configuration
4 -15	Figure 4-11	Black BJ Cartridge Structure
4 -16	Figure 4-12	Color BJ Cartridge Structure
4 -17	Figure 4-13	Bubble Jet Nozzles(Partial View)
4- 18	Figure 4-14	Nozzle Arrangement
4 -18	Figure 4-15	Contact Pad
4 -20	Figure 4-16	Bubble Jet Head Driver Block Diagram(Black BJ Cartridge)
4 -20	Figure 4-17	Bubble Jet Head Driver Block Diagram(Color BJ Cartridge)
4 -21	Figure 4-18	Bubble Jet Head Driver Block Diagram(Color BJ Cartridge Photo)
4 -21	Figure 4-19	Head Rank ID
4 -22	Figure 4-20	Head Temperature Controller
4 -24	Figure 4-21	Purge Unit
4 -25	Figure 4-22	Carriage
4 -26	Figure 4-23	Paper Thickness Adjustment
4 -27	Figure 4-24	Paper Feed Motor Drive Transmission
4 -28	Figure 4-25	Paper Feed Mechanism
4 -29	Figure 4-26	Paper Separater
4 -31	Figure 4-27	Printer Electrical System
4 -32	Figure 4-28	Logic Board Block Diagram
4 -32	Figure 4-29	Printer Block Diagram
4 -35	Figure 4-30	Motor-driving Circuit
4 -36	Figure 4-31	AC Adapter
4 -36	Figure 4-32	Power Supply
4 -37	Figure 4-33	Sensors
5 - 3	Figure 5- 1	Greasing Points
5 - 4	Figure 5- 2	Carriage Guide Frame
5 - 5	Figure 5- 3	Waste Ink Absorbers
5 - 7	Figure 5- 4	Head Gap Adjustment
5 - 8	Figure 5- 5	Preparations Before Adjustment
5 - 9	Figure 5- 6	Head Gap Adjustment
5 -10	Figure 5- 7	Carriage Guide Frame Movement Check
5 -29	Figure 5- 8	Logic Board
5 -32	Figure 5- 9	Carriage Ribbon Cable
5 -33	Figure 5-10	BJ Cartridge Contact Pad
5 -34	Figure 5-11	Logic Board (Top View)
5 -35	Figure 5-12	Logic Board (Bottom View)

IV. TABLE INDEX

Page		
	Part 3: Operating Instructions	
3 - 7	TABLE 3- 1	QUICK REFERENCE FOR SETTING
3 - 7	TABLE 3- 2	QUICK REFERENCE FOR SETTING
3 -11	TABLE 3- 3	ERROR DISPLAY
3 -13	TABLE 3- 4	DEFAULT SETTING MODES
3 -13	TABLE 3- 5	DEFAULT SETTING MODE FUNCTION SETTINGS
3 -18	TABLE 3- 6	SELF-TEST PRINT MODES
3 -21	TABLE 3- 7	HEXADECIMAL DUMP TEST PRINT
3 -22	TABLE 3- 8	EEPROM RESET AND DEFAULT SETTING
	Part 4: Technical Reference	
4 -10	TABLE 4- 1	PRINTING MODES AND HEATING METHODS
4 -19	TABLE 4- 2	LIST OF BLACK BJ CARTRIDGE SIGNAL CONTACTS
4 -19	TABLE 4- 3	LIST OF COLOR BJ CARTRIDGE SIGNAL CONTACTS
4 -39	TABLE 4- 4	LIST OF SENSOR FUNCTIONS
	Part 5: Maintenance	
5 - 7	TABLE 5- 1	TOOLS REQUIRED FOR HEAD GAP ADJUSTMENT
5 -30	TABLE 5- 2	BJ CARTRIDGE RECOGNITION

1. PERSONAL SAFETY PRECAUTIONS

1.1 Moving and Rotating Parts

Be careful not to let your hair, clothes, accessories, etc., become caught up in the moving and rotating parts of the printer. The moving and rotating parts which are the carriage belt, idler roller, and carriage, are driven by the carriage motor, slow down gear, paper feed roller, pressure roller, eject roller, spurs, and pick-up roller, etc., which are driven by the paper feed motor.

Be careful not to touch the spurs as they are sharply pointed.

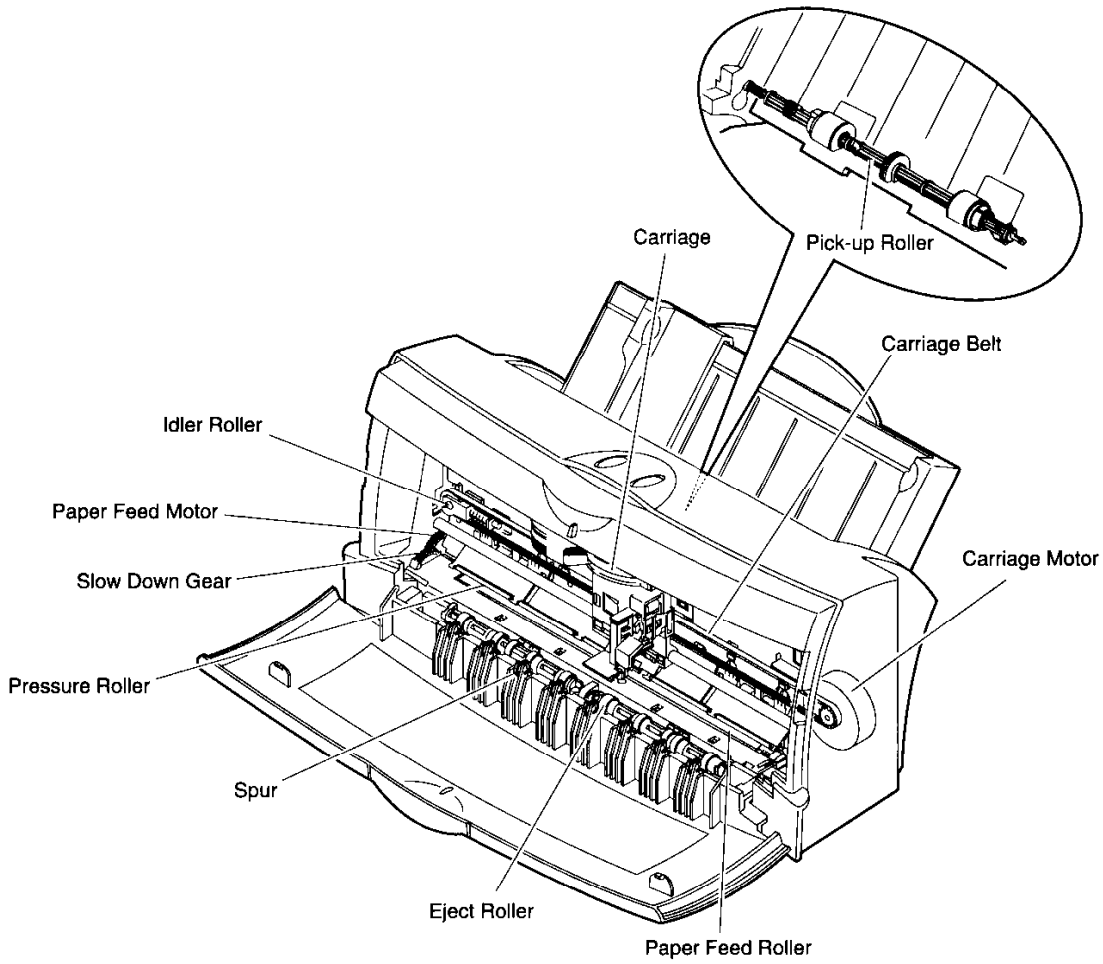


Figure 1-1 Moving and Rotating Parts

1.2 Ink Stains

1.2.1 Ink path

Be careful not to touch the ink path as it may stain the printer, your hands, or clothes during repair.

The ink path is the nozzle section of the BJ cartridge, head cap, head wiper, maintenance jet receiving section, and the waste ink absorbers.

For the color BJ cartridge, the ink inlets of the ink cartridge and the joint pipes of the print head body are also part of the ink path, so take the same care with them.

CAUTION

The ink is not a substance that is harmful to the human body, but it does contain an organic solvent.

Black ink: isopropyl alcohol 67-63-0, glycerin 56-81-5

Color ink: isopropyl alcohol 67-63-0, glycerin 56-81-5

Take care not to get ink in the mouth or eyes. If ink does get into the eyes, wash it out with plenty of water and consult a doctor immediately. If, for some reason a large amount of the ink is swallowed, consult a doctor immediately.

Please provide the doctor with the information printed on the BJ cartridge label. This ink contains dyes, and cannot be removed from clothing, etc.

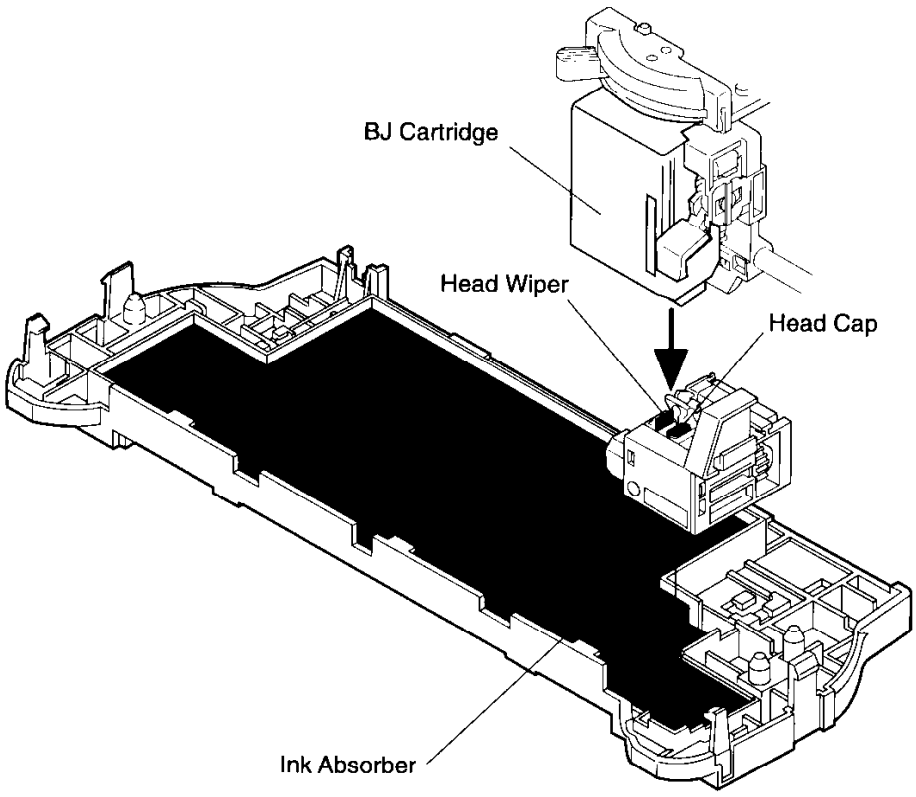


Figure 1-2 Ink Path

1.2.2 Ink mist

The BJ cartridge ejects ink onto the paper. However, after the printer has been used for a long period of time or under heavy duty use, a small amount of ink mist bouncing back off the paper during printing can dirty the inside of the front cover and platen area.

Wipe the dirty areas with a soft damp cloth as this ink can dirty the paper, or the hands or clothing of service personnel.

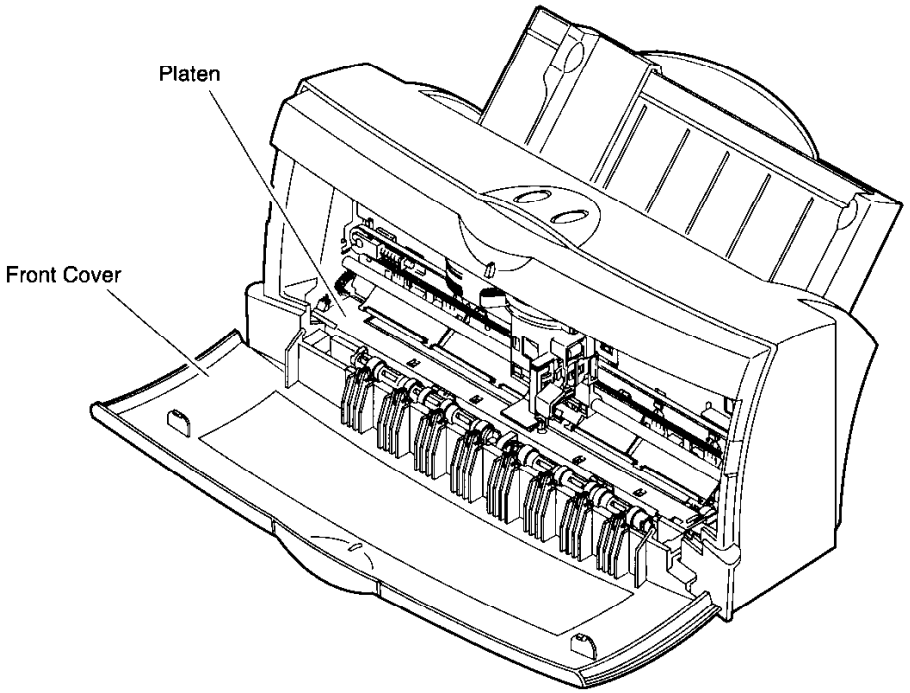


Figure 1-3 Ink Mist

2. MACHINE PRECAUTIONS

2.1 BJ Cartridge Handling

2.1.1 Unpacking the BJ cartridge

Do not unpack BJ cartridge packs until you are ready to use them. When installing the BJ cartridge in the printer, remove the head cap protecting the nozzle section and gently peel off the protection tape.

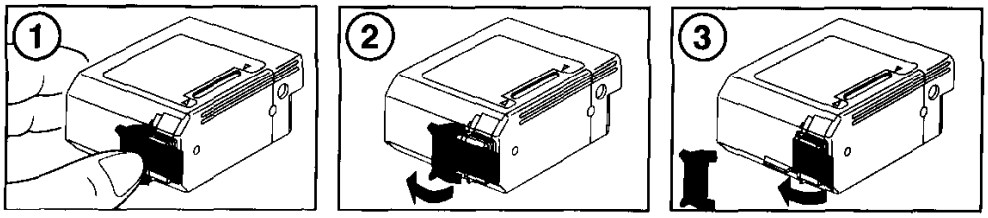


Figure 1-4 Removing the BJ Cartridge Protector

2.1.2 BJ cartridge protection

As a prevention measure of the nozzles clogging, never touch the nozzle section of the BJ cartridge or wipe it with tissue paper etc. Also, once the protection tape has been peeled off from a BJ cartridge, either install the cartridge in the printer or store it in the cartridge container below.

BJ cartridges can not be disassembled or washed.

NOTE

Clogged nozzles are the cause of the horizontal white lines that appear periodically on prints. If this problem is not rectified following the cleaning operation, replace the BJ cartridge.

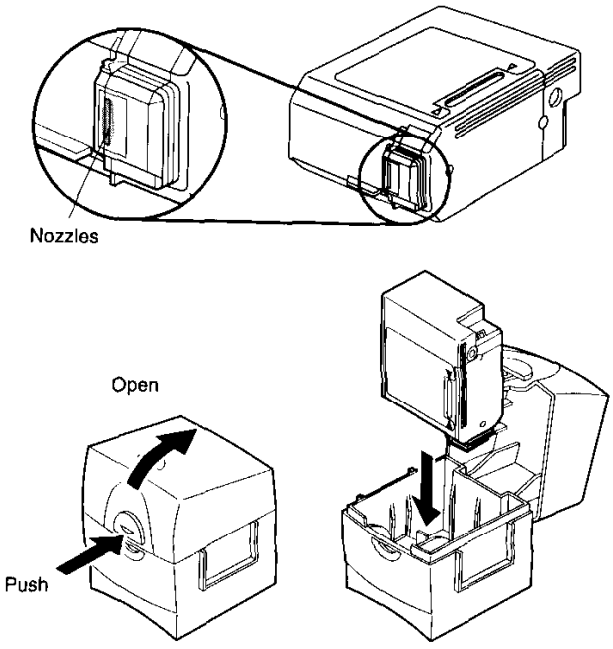


Figure 1-5 BJ Cartridge & Cartridge Container

2.1.3 Power on/off

When the power is switched off with the *POWER* button, the printer automatically caps the nozzle section of the BJ cartridge for protection and ink leakage prevention.
If the DC power cord is unplugged by mistake and the power supply is turned off, plug the DC power cord back in, then after the printer has start-up normally, switch off the power with the *POWER* button.

If the nozzles are not capped properly they can become clogged with dried ink, or ink may leak from the cartridge.

2.1.4 When not using the printer

The BJ cartridge should be left installed in the printer even when the printer is not in use, and while carrying, transporting, or storing the printer. If the BJ cartridge package has been opened but the cartridge is not to be installed immediately, store the cartridge in the cartridge container.

If the cartridge is taken out of the printer, the ink nozzles may dry up and become unusable.

2.1.5 Ink electroconductivity

The ink in the BJ cartridge is electrically conductive. If it leaks onto a mechanical section, wipe it up with a damp paper towel. If it leaks onto an electrical section, wipe it up completely with tissue paper. If the ink seeps through as far as to the IC chips or the logic board, and it is hard to wipe off completely, a new logic board should be installed.

Never switch the power on if a leakage has occurred, as this can damage the circuitry.

2.2 Printer Handling

2.2.1 Spur deformation precaution

Do not deform the spurs. If spurs are deformed, their contact area with the printed paper increases, causing more ink to adhere. This can lead to the paper becoming stained with ink. (A dotted line of ink may appear where the spurs have contacted the paper.)

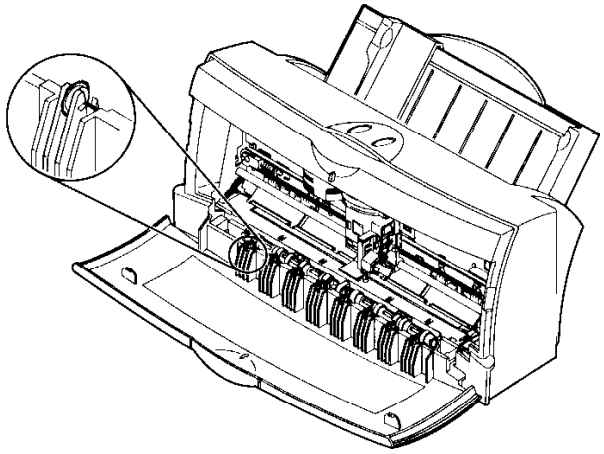


Figure 1-6 Spurs

2.2.2 Precautions to prevent damage from static electricity

The electrostatic charge accumulated on clothing can damage electric elements and their characteristics. Do not touch the contact points of the carriage ribbon cable and BJ cartridge.

Electrostatic Discharge

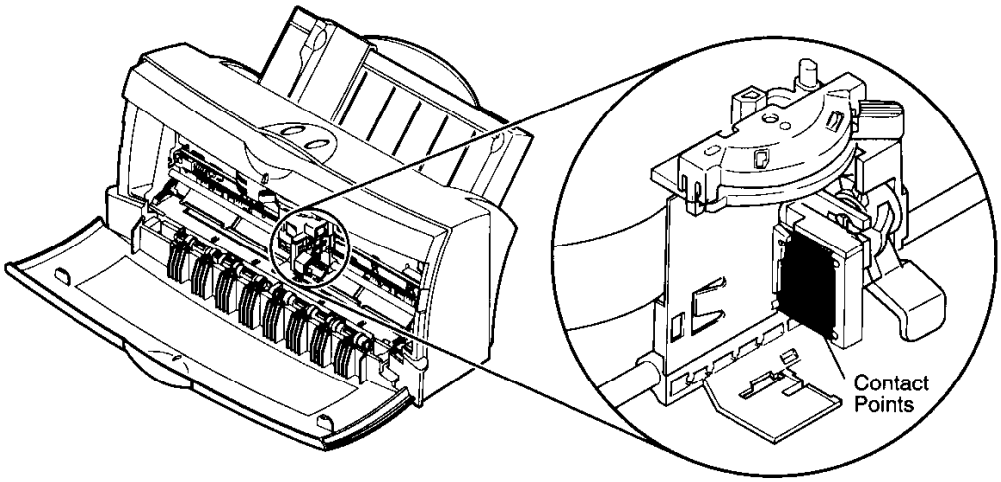


Figure 1-7 Contact Section of the Carriage Ribbon Cable

2.2.3 Ink leakage precautions

Do not carry, pack or store the printer without a BJ cartridge installed. The ink within the purge unit will flow back and contaminate the inside of the printer. When packing up the printer, make sure the carriage is in the capping position (the right end of the platen).

The nozzle section of the BJ cartridge is capped automatically when the power is switched off with the *POWER* button. Take care that when the power is turned off by unplugging the DC power cord, the BJ cartridge is not capped.

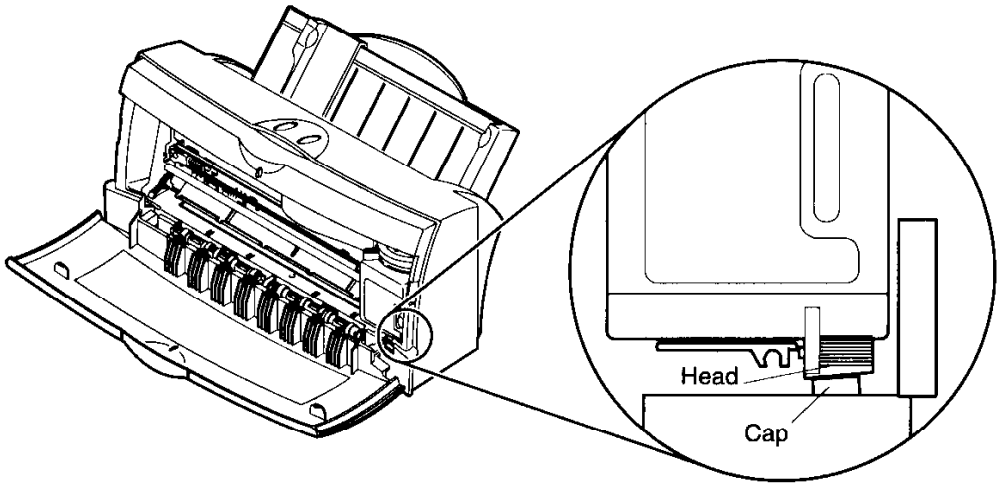


Figure 1-8 Capping Position

3. PRECAUTIONS FOR SERVICING

3.1 Precautions Concerning the Memory Data

The printer stores data on the total waste ink amount, and the total number of sheets printed with the black and color BJ cartridges respectively in the EEPROM on the logic board. Note the following precautions during servicing:

1) Before repair

EEPROM data can be confirmed with a test print. The total number of sheets printed in particular can provide an estimate as to how much the printer has been used.

2) When replacing the logic board (replacing the EEPROM)/When the memory data is cleared by mistake

Always make a visual check of the amount of waste ink absorbed into the waste ink absorbers and replace them when necessary as explained in *Part 5: 4.3 Logic Board and Waste Ink Absorbers Replacement Cautions* (Page 5-5).

If this operation is neglected, depending on the waste ink amount already absorbed into the waste ink absorbers, the capacity of the waste ink absorbers might be exceeded without the waste ink full error being generated, resulting in an ink leakage problem.

The memory data for the replacement logic board (EEPROM) is undefined. Therefore, after replacing the logic board (replacing the EEPROM), reset the total waste ink amount.

3) After replacing the waste ink absorber

After replacing the waste ink absorber, set the total waste ink amount to zero by clearing the memory data.

After the EEPROM is reset, the data cannot be printed out with a test printout. If you want to check the stored data, be sure to execute the test printout before resetting the EEPROM.

When the stored data is reset, the various settings, the total count of printed sheets, and the total waste ink amount will all be reset. The total sheets printed and waste ink amount cannot be written with the control panel.

Immediately after you start using the printer, it keeps track of the estimated waste ink amount based on the usage conditions. To prevent ink leakage when the waste ink amount exceeds the waste ink absorption capacity, the printer stops printing and indicates an error when the waste ink absorption capacity is close to being full.

For details on checking the EEPROM data with a test printout and for clearing the data, see *Part 3: 3.6.1 Resetting the EEPROM* (page 3-22).

If the printer stops operating because of a waste ink full error, follow the countermeasures described in *Part 5: 6. TROUBLESHOOTING* (page 5-10).

3.2 Static Electricity Precautions

The electrostatic charge accumulated in clothing can damage electric elements and their characteristics. In order to prevent static electricity, touch a metallic part that is grounded to release the static electricity before disassembling the printer for servicing. Before discharging static electricity, do not touch electrical sections such as the logic board and contact points of the carriage ribbon cable (see Figure 1-7) when the carriage ribbon cable is connected to the logic board.

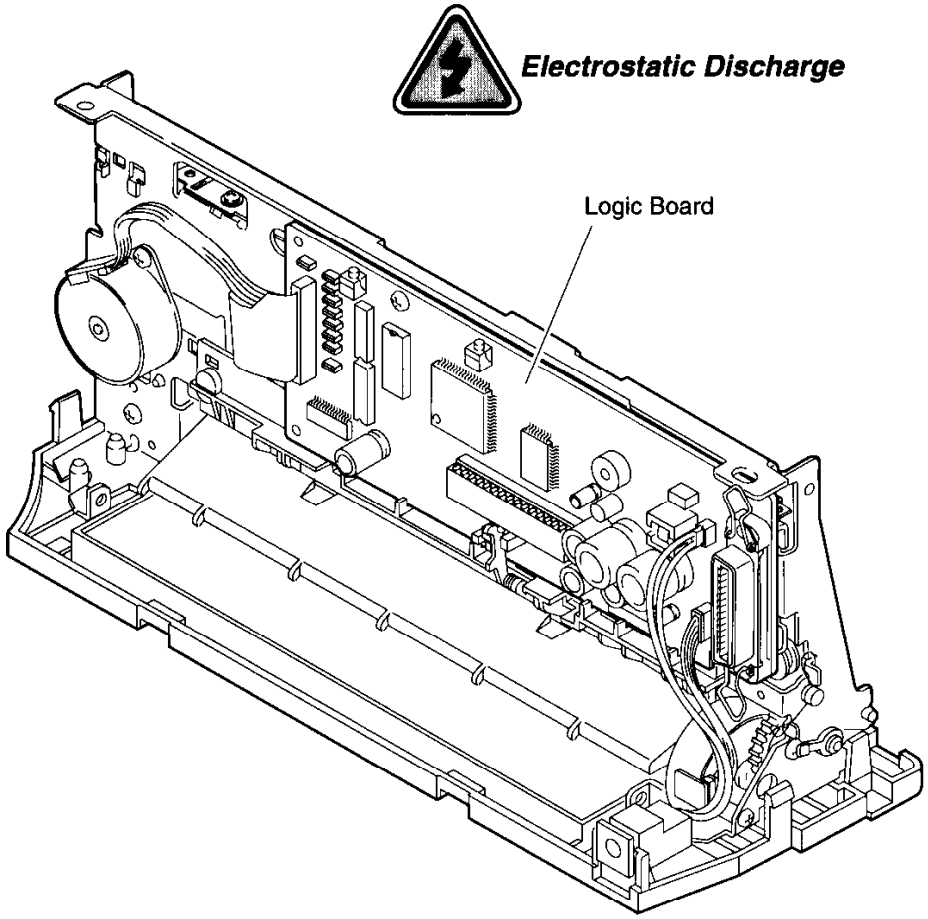


Figure 1-9 Printer Electronical System

3.3 Disassembly / Reassembly Precautions

The sections below require particular care during disassembly and assembly. The details are explained in *Part 5: 4. DISASSEMBLY AND REASSEMBLY* (Page 5-4). Read it before disassembling and assembling the printer.

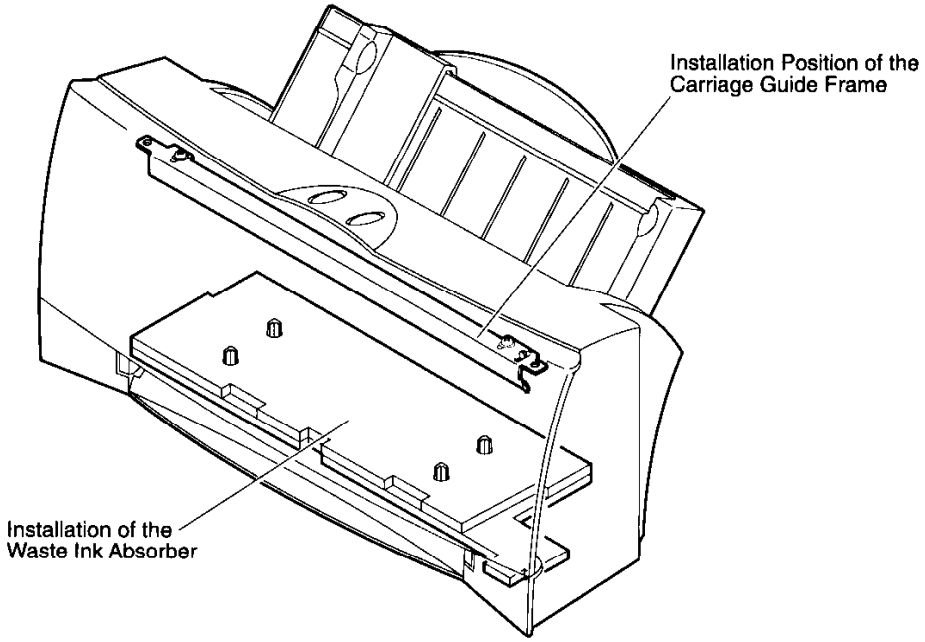


Figure 1-10 Disassembly / Assembly Precautions

The printer is composed of many plastic parts. When disassembling the printer, be careful not to brake or bend the plastic hooks.

CAUTION

Some of the plastic parts are made of extremely hard materials with glass fibers to raise part precision, however as their viscosity is low, plastic hooks can break easily from mishandling. Use a precision screwdriver, and do not apply excessive force to release the hooks.

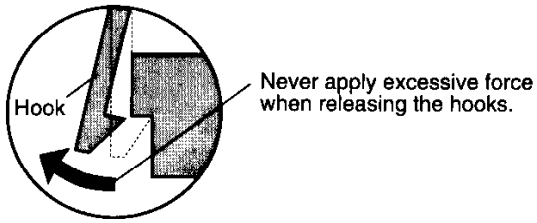


Figure 1-11 Releasing Plastic Hooks

3.4 Built-in Self-diagnostic Functions

The printer has built-in self-diagnostic functions to assess hardware defects. The results of self-diagnosis are indicated by the indicators and the beeper. For details, refer to *Part 3*: 3.1 Error Indications (Page 3-11).

1. PRODUCT OUTLINE

1.1 Product Outline

This printer enjoys the realization of photo-like high image quality printing through the implementation of the Photo Kit option for BJC-240 (the color BJ cartridge BC-06 photo, BJ cartridge container SB-06 and Canon coated paper HR-101).
The printer uses three types of BJ cartridges: the color BJ cartridge BC-05, the color BJ cartridge BC-06 photo and the black BJ cartridge BC-02. The printer is capable of high-speed, high-quality 360 dpi × 360 dpi (H × V) printing. Also, with the black BJ cartridge, smoothing can be used to obtain a resolution of 720 dpi × 360 dpi (H × V). This printer can be operated in a Windows environment with ease and settings can be adjusted with the BJ Setup Utility. The printer utilizes a leverless ASF paper select

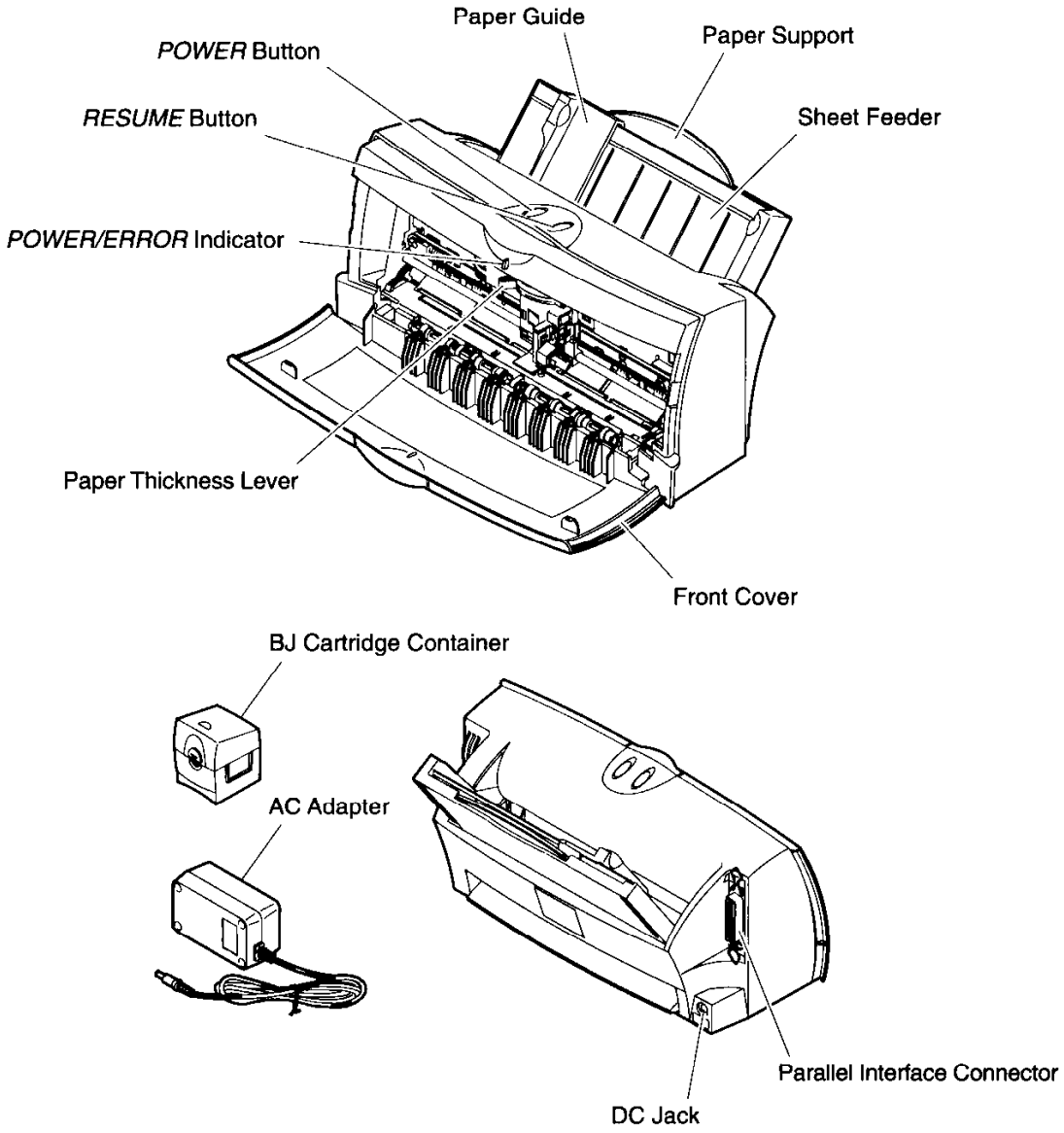


Figure 2-1 Printer Appearance

system. A new introduction to this printer is the manual feeding slot for printing different paper types while paper is loaded in the ASF. This slot can also be utilized as a supplementary paper pick-up slot for feeding single sheets of paper.
All the function settings are easily set the host computer. The operation is easily performed with the bidirectional Centronics interface (effective only for the device ID response in nibble mode).
This printer uses an AC adapter. This new compact printer is light in weight and very economically priced.

1.2 Features

1. Compact (desk-top size)
   Dimensions: 361 mm (14.21") W × 215 mm (8.46") D × 171 mm (6.73") H
   Weight: Approximately 2.5 kg (5.5 lbs) (including BJ cartridge)

2. AC adaptor: AD300
   (Power control depending on the print duty)

3. Two types of built-in printer control modes *
   LQ mode (EPSON LQ-510 emulation)
   BJ mode (IBM Proprinter X24E emulation)
   (Canon extended mode is selected when Canon's driver is used.)

4. User replaceable black BJ cartridge (BC-02), color BJ cartridge (BC-05/BC-06 photo) *
   Color BJ Cartridge BC-05/ BC-06 photo
   Print head: C x 16, M x 16, Y x 16 nozzles (vertically lined)
   Ink color: Cyan, magenta and yellow (Tri-color)
   (Black color is printed in composite black.)
   Black BJ Cartridge BC-02
   Print head: 64 nozzles (vertically lined)
   Ink color: Black

5. High quality printing at 720 (H) × 360 (V) dpi (Smoothing mode) *
   (In the smoothing mode using black BJ cartridge BC-02)

6. "Plug and Play" by the device ID response function
   (Effective only for the device ID response)

7. BJ cartridge container (for BC-02/BC-05/BC-06 photo) packed with the printer

8. Functions set by the Windows driver or BJ setup utility program
   (No DIP switches)

9. Simple operation panel with two buttons and one LED

10. New built-in cut sheet feeder without the paper selection lever

11. Introduction of a manual feeding slot

12. Photo-like high quality printing by using the Photo Kit (color BJ cartridge BC-06 photo, BJ cartridge container SB-06 and Canon coated paper HR-101).

* See the table below.

	Canon extended mode			Emulation mode		
	BC-02	BC-05	BC-06 photo	BC-02	BC-05	BC-06 photo
Color print	—	Available	Available	—	Not available (Bk only)	Not available
Smoothing	Available	Not available	Not available	Available	Not available	Not available

1.3 BJ Cartridge

1.3.1 Color BJ cartridge

The color BJ cartridge (BC-05/BC-06 photo) holds three color inks; yellow, magenta and cyan. Using these three colors produces composite black.
The first 16 nozzles are for yellow, the following 8 nozzles are unused, the second 16 nozzles are for magenta, then 8 nozzles unused, and the third 16 nozzles are for cyan. They are lined vertically.
When using the color BJ cartridge, 360 (H) x 360 (V) dpi printing is possible.
Photo-like printing can be realized by using the color BJ cartridge BC-06 photo.
Use the coated paper HR-101 when printing with BC-06 photo cartridge.
Since the three color inks are integrated, when one color ink runs out, the entire color BJ cartridge must be replaced. Also, when more than 6 months have passed after the cartridge is unpacked, or if the printing quality is not improved even after cleaning the head over five times, replace the color BJ cartridge.

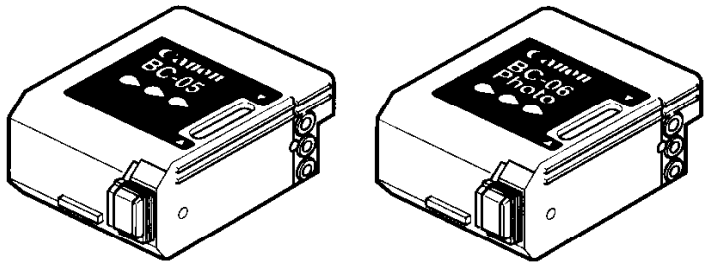


Figure 2-2 Color BJ Cartridge

1.3.2 Black BJ cartridge

The black BJ cartridge (BC-02) holds black ink only. The print head has 64 nozzles, all of which are used for black printing.
When using the black BJ cartridge in the smoothing mode, 720 (H) x 360 (V) dpi printing is possible.
When the ink runs out, or more than 6 months have passed after the cartridge is unpacked, or if the printing quality is not improved even after cleaning the head over five times, replace the black BJ cartridge.

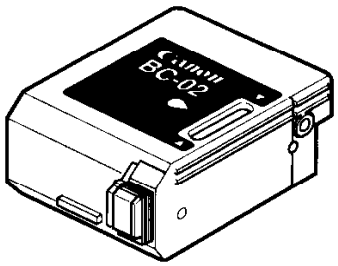


Figure 2-3 Black BJ Cartridge

1.4 BJ Cartridge Container

The cartridge container is used for storing BJ cartridges which are not being used. When storing a BJ cartridge in this container, be sure to close the cover completely. Store either black or color BJ cartridges, which are not installed in the printer.

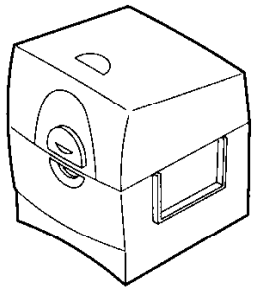
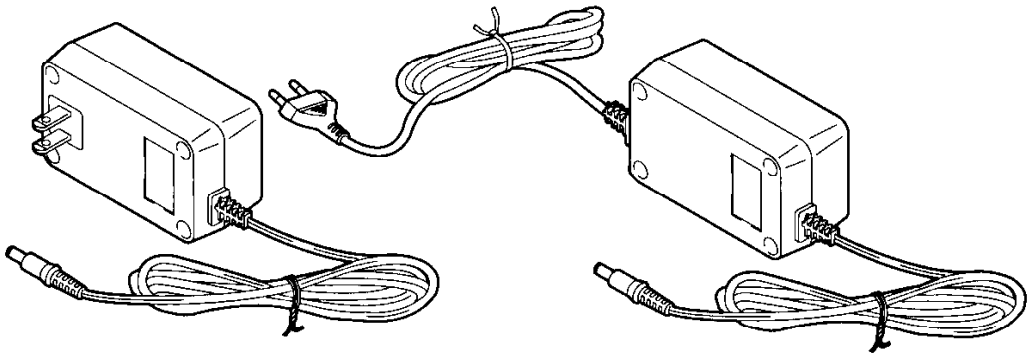


Figure 2-4 BJ Cartridge Container

1.5 AC Adapter

The AC adapter supplies DC power (+13.5 V) required to operate the printer.

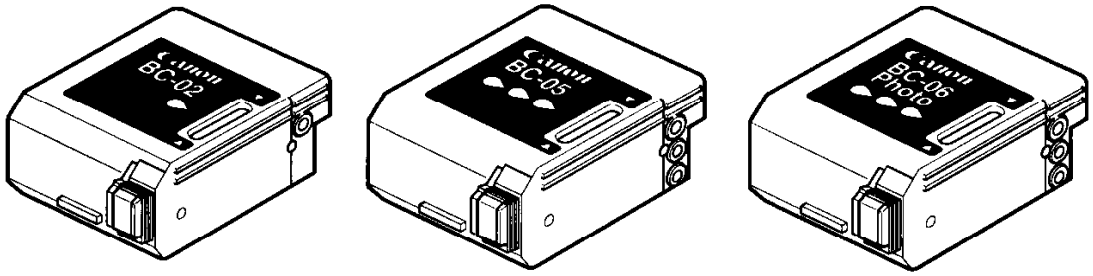


[120V type] [220V-240V type]

Figure 2-5 AC Adapter

1.6 Consumables

1.6.1 BJ cartridges (Color and black)



Black BJ Cartridge | Color BJ Cartridge | Color BJ Cartridge Photo

Figure 2-6 Consumables

The numbers of sheets that can be printed with the color and black cartridges are :

Color BJ cartridge (BC-05)
About 80 sheets: (HQ mode, 7.5% duty per color pattern*, continuous printing)
About 100 sheets: (HQ mode, 7.5% duty per color pattern*, intermittent printing)

Black BJ cartridge (BC-02)
About 450 sheets : (HQ mode, 1500 characters pattern, continuous printing)

* Color print pattern for C/M/Y/Bk

2. SPECIFICATIONS

2.1 General Specifications

1. Type

Desk-top serial color bubble jet printer

2. Paper feeding method

Auto feeding (Cut sheet feeder)
Manual feeding (Manual feeding slot)

3. Cut sheet feeder capacity

Plain paper: Maximum 10 mm (approximately 100 pages of 75g/m² paper)
Envelope: 10 envelopes (Commercial number 10 and DL)
Transparencies: 50 sheets
BPF: 10 sheets

4. Manual feeding slot capacity

One sheet

5. Paper weight

Automatic feed / Manual feeding slot: 64 to 105 g/m² (17 lbs to 28 lbs)

6. Printing speed

Black BJ Cartridge	BC-02	3.1 ppm in HQ mode (Burst : 204 cps)
		3.4 ppm in HS mode (Burst : 248 cps)
Color BJ Cartridge	BC-05	0.24 ppm in normal mode
		0.12 ppm in fine mode

7. Printing direction

Unidirectional / Bidirectional *
(* Print direction automatically changes according to optimum printing directional control.)

8. Print width

Maximum 203.2mm (8")

9. Line feed speed

Approx. 100 ms/line (1/6" line feed)

10. Built-in printing control modes

LQ mode: Epson LQ-510 emulation
BJ mode: IBM Proprinter X24E emulation
(Canon extended mode is selected when Canon's driver is used.)

11. Line feed pitch (n: programmable)

LQ mode: 1/6", 1/8", n/180", and n/360"
BJ mode: 1/6", 1/8", n/60", n/72", n/180", n/216", and n/360"

12. Printing characters

Typefaces:	LQ mode	Roman, San Serif, Courier, Prestige, Script,
	BJ mode	Courier, Prestige
Pitch:	LQ mode	10, 12, 15, 17, 20 cpi, and PS
	BJ mode	10, 12, 17 cpi, and PS
Character matrix:	HQ mode	36 (H) × 48 (V) dots
	HS mode	18 out of 36 (H) × 48 (V) dots
Character set:	LQ mode	Italic character set, Graphic character set and Internatinal character set
	BJ mode	IBM character set 1, 2 and all character set (code page 437, 850, 852, 860, 863 and 865)

13. Number of columns printed

	Mode	Pitch	cpl *
LQ mode	10 cpi	10 cpi	80 cpl
	10 cpi doublewide	5 cpi	40 cpl
	10 cpi condensed	17 cpi	136 cpl
	10 cpi condensed-doublewide	8.5 cpi	68 cpl
	12 cpi	12 cpi	96 cpl
	12 cpi doublewide	6 cpi	48 cpl
	12 cpi condensed	20 cpi	160 cpl
	12 cpi condensed-doublewide	10 cpi	80 cpl
	15 cpi	15 cpi	120 cpl
	15 cpi doublewide	7.5 cpi	60 cpl
	Proportional spacing	PS	Varies
BJ mode	10 cpi	10 cpi	80 cpl
	10 cpi doublewide	5 cpi	40 cpl
	10 cpi condensed	17 cpi	136 cpl
	10 cpi condensed-doublewide	8.5 cpi	68 cpl
	12 cpi	12 cpi	96 cpl
	12 cpi condensed doublewide	6 cpi	48 cpl
	Proportional spacing	PS	Varies

* cpl: characters per line

14. Bit image

Vertical: 8, 24 and 48 dots
Horizontal: 60, 120, 180, 240, 360 and 720* dpi
* In smoothing mode: Available when using the Canon's driver and BC-02 cartridge.

15. Buffer

BJ Cartridge	Buffer size setting *	Receive buffer size	Download buffer size
BC-02	Download buffer	8 kB	32 kB
	Receive buffer	40 kB	0 kB
BC-05	—	10 kB	0 kB
BC-06 photo	—	10 kB	0 kB

* Set by the BJ setup utility program

16. Interface

IEEE1284 compatible parallel interface

17. BJ cartridge

Color BJ cartridge (BC-05)

Print head: C x 16, M x 16, Y x 16 nozzles (vertically lined)
Ink colors: Cyan, magenta and yellow (Tri-color)
(Black color is printed in composite black.)
Service life:
About 80 sheets: (HQ mode, 7.5% duty per color pattern*, continuous printing)
About 100 sheets: (HQ mode, 7.5% duty per color pattern*, intermittent printing)
* Color print pattern for C/M/Y/Bk
Weight: Approximately 62g (2.2 oz)

Black BJ cartridge (BC-02)

Print head: 64 nozzles (vertically lined)
Ink color: Black
Service life:
About 450 sheets : (HQ mode, 1500 characters pattern, continuous printing)
Weight: Approximately 58.5 g (2.0 oz)

18. Sensor functions

Paper out: Provided
Paper width: None
Installation of BJ cartridge: Provided
BJ cartridge identification: Provided
Waste ink amount: Provided
Ink out: None

19. Acoustic noise level

Approximately 45dB (A) or less/ HQ mode (Sound pressure level: According to ISO 9296)

20. Ambient conditions

	During operation	During storage
Temperature	5°C to 35°C (41°F to 95°F)	0°C to 35°C (32°F to 95°F)
Humidity	10% to 90%RH (no condensation)	5% to 95%RH (no condensation)

20. Power source

	Voltage/Frequency	Power consumption	Stand-by status
USA/Canada UK/Australia Europe	AC 120V 60 Hz AC 240V 50 Hz AC 230V 50 Hz	Max. 20 W	Max. 5 W

21. Dimensions

361 mm (14.21") W × 215 mm (8.46") D × 171 mm (6.73") H

22. Weight

Approximately 2.5 kg (5.5 lbs) (including BJ cartridge)

2.2 Paper Specifications

2.2.1 Paper size

Letter (8.5" × 11")
Legal (8.5" × 14")
A5 (148 mm × 210 mm)
A4 (210 mm × 297 mm)
Commercial number 10 envelope (4.1" × 9.5")
European DL-size (220 mm × 110 mm)

2.2.2 Paper type (Recommended)

Plain paper
Coated paper (Canon coated paper HR-101)
Envelope (Commercial number 10 or European DL)
Transparencies (Canon transparency film CF-102)
BPF (Canon back print film BF-102)
Glossy paper (Canon glossy paper GP-101)
High gloss paper (Canon High Gloss Film HG-101)
Fabric sheet (Fabric sheet FS-101)

2.2.3 Print paper

1) Cut sheet feeder

Media	Thickness Lever	Paper Support	Paper Feed	
			Method	Limit
Plain paper	Left	Up	Auto	10 mm
Coated paper	Left	Up	Auto	10 mm
Envelopes	Right	Up	Auto	10 envelopes
Transparencies	Left	Up	Auto	50 sheets
Back Print Film	Left	Up	Auto	10 sheets
Glossy Paper	Right	Up	Auto	1 sheet
Fabric sheet	Right	Up	Auto	1 sheet

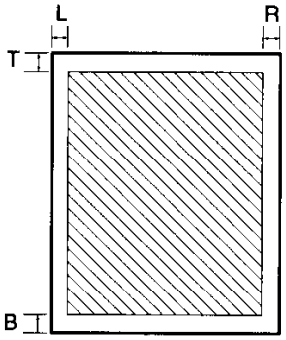
2) Manual feeding slot

Media	Thickness Lever	Paper Feed	
		Method	Limit
Plain paper	Left	Manual	1 sheet
Coated paper	Left	Manual	1 sheet
Envelopes	Right	Manual	1 envelope
Transparencies	Left	Manual	1 sheet
Back Print Film	Left	Manual	1 sheet
Glossy Paper	Right	Manual	1 sheet
Fabric sheet	Right	Manual	1 sheet
High Gloss Film	Left	Manual	1 sheet

2.2.4 Printing range

1) Plain paper and special media

The shaded portion in the diagram below shows the printable area and recommended printing area for paper and special media.



Printable Area

Minimum		
L	3.4 mm	0.13"*1
R	3.4 mm	0.13"
T	3.0 mm	0.12"
B	7.0 mm	0.27"

Recommended Printing Area

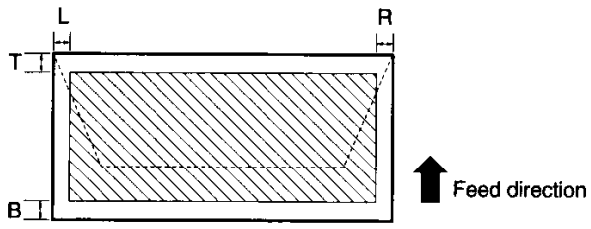
Minimum		
L	3.4 mm	0.13"*1
R	3.4 mm	0.13"
T	12.7 mm	0.5"
B	12.5 mm	0.49"

*1: When LTR is selected in the BJ setup utility program, L is 6.4mm(0.25") minimum.

Figure 2-7 Printing Area

2) Envelope

The shaded portion in the diagram below shows the printable area and recommended printing area for U.S. Commercial 10 envelopes (9.5 × 4.1 inches) and European DL-size envelopes (229 × 110 mm).



Printable Area

Minimum		
L	6.4 mm	0.25"
R	10.4 mm	0.41"*1
T	3.0 mm	0.12"
B	7.0 mm	0.28"

Recommended Printing Area

Minimum		
L	6.4 mm	0.25"
R	10.4 mm	0.41"*1
T	12.7 mm	0.5"
B	12.5 mm	0.49"

*1: For Commercial number 10 envelopes, 31.4mm(1.2").

Figure 2-8 Printing Area (Envelope)

2.3 Interface Specifications

The parallel interface sends 8 bits (one byte) of data at a time and is transistor-transistor-logic (TTL) compatible.
The interface cable must be made of American Wire Gauge (AWG) No. 28 or larger. The maximum length of the twisted-pair shielded cable must be 2.0 m (approximately 6.6 feet).

1) Interface Type
IEEE1284 compatible parallel interface
2) Data transfer
8-bit parallel interface
3) Signal voltage levels
Low: 0.0 V to +0.8 V
High: +2.4 V to +5.0 V
4) Input/ output
Each signal pulled up with +5V.
5) Interface cable
Type: Twisted-pair shielded cable
Material: AWG#28 or larger
Length: Up to 2.0 m (6.6 feet)
6) Interface connectors
On printer: Amphenol 57-40360 (or equivalent)
On cable: Amphenol 57-30360 (or equivalent)
7) Input/ output signals and pin layout

Compatible mode

No.	Signal	I/O	No.	Signal	I/O
1	$\overline{\text{STROBE}}$	IN	19	$\overline{\text{STROBE}}$-RET*1	...
2	DATA1	IN	20	DATA1-RET	...
3	DATA2	IN	21	DATA2-RET	...
4	DATA3	IN	22	DATA3-RET	...
5	DATA4	IN	23	DATA4-RET	...
6	DATA5	IN	24	DATA5-RET	...
7	DATA6	IN	25	DATA6-RET	...
8	DATA7	IN	26	DATA7-RET	...
9	DATA8	IN	27	DATA8-RET	...
10	$\overline{\text{ACKNLG}}$	OUT	28	$\overline{\text{ACKNLG}}$-RET	...
11	BUSY	OUT	29	BUSY-RET	...
12	P.E.	OUT	30	P.E.-RET	...
13	$\overline{\text{SELECT}}$	OUT	31	$\overline{\text{INIT}}$	IN
14	$\overline{\text{AUTO FEED XT}}$*4	IN	32	$\overline{\text{ERROR}}$	OUT
15	N.C*2	...	33	GND	...
16	$\overline{\text{INIT}}$-RET*1	...	34	N.C*2	...
17	GND	...	35	+5.0V*4	...
18	+5.0V*3	...	36	$\overline{\text{SELECT IN}}$*5	IN

*1: All-RETs are connected to GND.
*2: N.C means no connection.
*3: The level is connected with +5.0V through 390Ω resistor.
*4: The level is connected with +5.0V through 3.3kΩ resistor.
*5: These signals are effective only in LQ printer control mode.

Nibble mode

No.	Signal	I/O	No.	Signal	I/O
1	HostClk	IN	19	Signal Gnd	...
2	DATA1	IN/OUT	20	Signal Gnd	...
3	DATA2	IN/OUT	21	Signal Gnd	...
4	DATA3	IN/OUT	22	Signal Gnd	...
5	DATA4	IN/OUT	23	Signal Gnd	...
6	DATA5	IN/OUT	24	Signal Gnd	...
7	DATA6	IN/OUT	25	Signal Gnd	...
8	DATA7	IN/OUT	26	Signal Gnd	...
9	DATA8	IN/OUT	27	Signal Gnd	...
10	Ptr Clk	OUT	28	Signal Gnd	...
11	Ptr Busy	OUT	29	Signal Gnd	...
12	Ack Data Req	OUT	30	Signal Gnd	...
13	Xflag	OUT	31	INIT	IN
14	Host Busy	IN	32	DataAvail	OUT
15	Not Defined	...	33	Not Defined	...
16	INIT -RET *1	...	34	Not Defined	...
17	F.G	...	35	Not Defined	...
18	Vcc	...	36	1284 Active	IN

*1: All-RETs are connected to GND.

8) Input/ output signals:

Compatible Mode

STROBE [Input]

This signal is used to read DATA1 to DATA8. The signal becomes valid after BUSY signal goes Low and the printer outputs an ACKNLG signal. The host computer does not send the next signal until it receives ACKNLG signal. It is normally High; after it goes Low, the printer receives data. When the signal remains Low, the printer does not operate until it goes High.

DATA1 to 8 [Input]

The printer receives data with the STROBE signal. The state of each bit of the signal must be maintained for at least 0.5 µs from the rising edge of the STROBE signal.

ACKNLG [Output]

This signal is a response signal to the STROBE signal. The host computer does not send the next STROBE signal until this signal is sent. When the power is turned on or the BUSY signal goes Low for the input of the INIT signal, this signal is sent regardless of the STROBE signal.

BUSY [Output]

When this signal is High, the printer is BUSY; when Low, the printer is READY. The signal goes High when data is received, when the printer is offline, or when an error occurs (paper-out, paper jam).

P.E. [Output]

When the printer cannot feed paper, this signal goes High. Then BUSY signal goes High and the SELECT and FAULT signals go Low. The signal goes Low when the paper is set and the printer goes online. FAULT and SELECT signals then go High from Low. If paper is not ejected (paper jam) by executing paper eject command, this signal and BUSY signal go High, and SELECT and FAULT go Low. In this case, the signals do not change even if the paper is ejected.

SELECT [Output]

The printer is selected when this signal is High. The printer is deselected when this signal is Low. This signal goes Low when the printer is offline or when an error occurs (paper-out, paper jam, head error, etc.).

AUTO FEED XT [Input] (Valid in LQ mode)

When this signal is Low, automatic line feed mode (Carriage Return and Line Feed) is effective.

The printer judges the level of this signal only when it is turned on or is initialized by the INIT signal.

INIT [Input]

INIT from the system resets the printer to its initial power-on state. In BJ mode, the BUSY signal goes High, and any received data is printed. In LQ mode, the BUSY signal goes High, and the print buffer is cleared. When INIT signal goes Low, it resets the printer to the power-on default state.

FAULT [Output]

This signal goes Low when the printer is in an error state (paper-out, paper jam, etc.).

SELECT IN [Input] (Valid in LQ mode)

When this signal is High, the DC1 and DC3 codes are valid; When Low, they are invalid. The printer judges the level of this signal when it is turned on or is initialized by the INIT signal.

Nibble Mode

Host Clk (Input)

The STROBE signal is to read DATA 1 to DATA 8.

Negotiation phase:

Trigger signal to send the protocol confirmation to the printer.

DATA 1-8 (Input)

The printer receives data with the Host Clk signal.

The state of each bit of this signal must be maintained for at least 0.5 µs from the rising edge of the Host Clk signal.

Ptr Clk (Output)

Reverse data transmission phase:

The printer requests the host computer to read the data by making the Ptr Clk signal Low. After finishing reading, the host computer notifies peripheral equipment of completion of data receiving by making the Host Busy signal High.

Ptr Busy (Output)

Reverse data transmission phase:

Indicates bit 3 and bit 7 of the transmission data.

Ack Data Req (Output)

- Reverse data transmission phase:
  Indicates bit 2 and bit 6 of the transmission data.
- Negotiation phase:
  Trigger signal to inform the host computer of the printer's is condition (Whether it supports nibble mode or not, whether there is reverse transmission data or not).

Xflag (Output)

- Reverse data transmission phase:
  Indicates bit 1 and bit 5 of the transmission data.
- Negotiation phase:
  Informs the host computer whether printer supports nibble mode or not, synchronizing with the falling edge of the Ack data Req signal. "Low" means that it supports nibble mode.

Host Busy (Input)

- Reverse data transmission phase:
  Indicates that the host computer is ready to receive the data from the printer by making the Host Busy signal Low. After that, it goes High in synchronizing with Low pulse of $\overline{\text{Ptr Clk}}$ signal to verify receiving data.
- Reverse idle phase:
  The Host Busy signal goes High in response to the Low pulse of the $\overline{\text{Ptr Clk}}$ signal, and enters the reverse data transmission phase again.

$\overline{\text{INIT}}$ (Input)

When this signal becomes Low, the printer's state becomes BUSY. When the signal changes from Low to High, it resets the printer control system to the initial state. This signal is normally High and the pulse width must be at least 0.5 µs at the printer side.

After initializing, the printer enters the compatible mode.

$\overline{\text{DataAvail}}$ (Output)

- Reverse data transmission phase:
  Indicates bit 0 and bit 4 of the transmission data.
- Negotiation phase:
  Informs the host computer if there is reverse transmission data or not in synchronizing with the falling edge of the Ack Data Req signal. "L" means that there is reverse transmission data.

$\overline{\text{1284 Active}}$ (Input)

This signal confirms that the printer is a 1284 compatible device when $\overline{\text{1284 Active}}$ signal goes High and Host Busy signal goes Low. It goes Low with the termination phase.

9) Timing

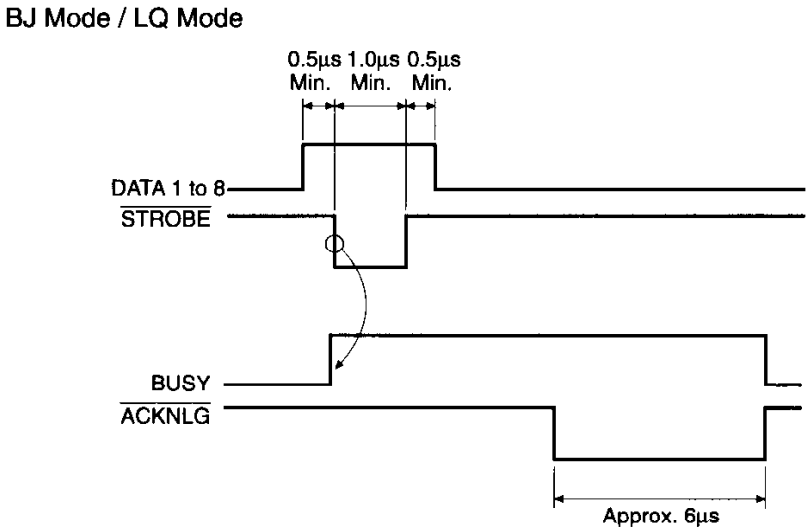


Figure 2-9 Timing Chart (Compatible Mode)

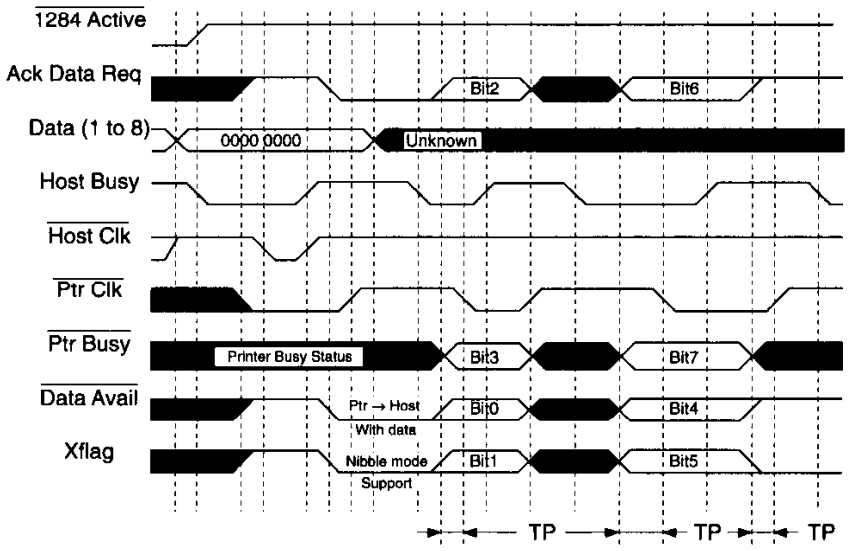


Figure 2-10 Timing Chart (Nibble Mode)

2.4 Character Code Tables

2.4.1 BJ mode

a) USA Code page 437

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡	0000
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±	0001
2	●	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	┤	├	╙	π	≤	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√	1011
C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²	1101
E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

b) Multilingual Page 850

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á	▒	└	ð	Ó	-	0000
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▓	┴	Ð	ß	±	0001
2	●	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	‗	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	┤	├	Ë	Ò	¾	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§	0101
6	♠	▬	&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸	0111
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	¢	╩	┌	Û	·	1010
B	♂	←	+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹	1011
C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³	1100
D	♪	↔	-	=	M	]	m	}	ì	Ø	¡	¥	═	¦	Ý	²	1101
E	♫	▲	.	>	N	^	n	~	Ä	×	«	╜	╬	Ì	¯	■	1110
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	¤	▀	´	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

c) Slavic Code Page 852

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á		└	đ	Ó	–	0000
1	☺	◄	!	1	A	Q	a	q	ü	Ĺ	í		┴	Đ	ß	´	0001
2	☻	↕	"	2	B	R	b	r	é	Í	ó	▒	┬	Ď	Ô	˛	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	|	├	Ë	Ń	˝	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	Ą	┤	─	ď	ń	ˇ	0100
5	♣	§	%	5	E	U	e	u	ů	Ľ	ą	Á	┼	Ň	ň	Ş	0101
6	♠	▬	&	6	F	V	f	v	ć	Ľ	Ž	Â	Ă	Í	Š	÷	0110
7	•	↨	'	7	G	W	g	w	ç	Ś	ž	Ě	ă	Î	š	¸	0111
8	◘	↑	(	8	H	X	h	x	ł	ś	Ę	Ş	╚	ě	Ř	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	ę	╣	╔	┘	Ú	¨	1001
A	■	→	*	:	J	Z	j	z	Ő	Ü		║	╩	┌	ŕ	·	1010
B	♂	←	+	;	K	[	k	{	ő	Ť	ź	╗	╦	█	Ű	ú	1011
C	♀	∟	,	<	L	\	l	|	î	ť	Č	╝	╠	▄	ý	Ř	1100
D	♪	↔	-	=	M	]	m	}	Ź	Ł	ş	ź	═	Ţ	Ý	ř	1101
E	♫	▲	.	>	N	^	n	~	Ä	×	«	ż	╬	Ů	ţ	■	1110
F	☼	▼	/	?	O	_	o	⌂	Ć	č	»	┐	¤	■	´	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

d) Portuguese Code Page 860

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á		└	╨	α	≡	0000
1	☺	◄	!	1	A	Q	a	q	ü	À	í		┴	╤	ß	±	0001
2	●	↕	"	2	B	R	b	r	é	È	ó	▒	┬	╥	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	|	├	╙	π	≤	0011
4	♦	¶	$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	Ì	¿	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	Ê	Õ	Ò	╣	╔	┘	Θ	•	1001
A	■	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	Í	¢	½	╗	╦	█	δ	√	1011
C	♀	∟	,	<	L	\	l	|	Ô	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	ì	Ù	¡	╜	═	▌	ϕ	²	1101
E	♫	▲	.	>	N	^	n	~	Ã	₧	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	Â	ó	»	┐	╧	■	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

e) Canadian French Code Page 863

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	¦		└	╨	α	≡	0000
1	☺	◄	!	1	A	Q	a	q	ü	È	´		┴	╤	ß	±	0001
2	☻	↕	"	2	B	R	b	r	é	Ê	ó	▒	┬	╥	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤	0011
4	♦	¶	$	4	D	T	d	t	Â	Ë	¨	┤	─	╘	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	Ï	.	╡	┼	╒	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	¶	û	³	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	¯	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	¤	Î	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ô	⌐	╣	╔	┘	Θ	•	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√	1011
C	♀	└	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	_	Ù	¾	╜	═	▌	ϕ	²	1101
E	♫	▲	.	>	N	^	n	~	À	Û	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	§	ƒ	»	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

f) Norwegian Code Page 865

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	Ø	►	SP	0	@	P	`	p	Ç	É	á		└	╨	α	≡	0000
1	☺	◄	!	1	A	Q	a	q	ü	æ	í		┴	╤	ß	±	0001
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥	0010
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤	0011
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠	0100
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡	0101
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷	0110
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°	1000
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•	1001
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	♂	←	+	;	K	[	k	{	ï	ø	½	╗	╦	█	δ	√	1011
C	♀	└	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n	1100
D	♪	↔	-	=	M	]	m	}	ì	Ø	¡	╜	═	▌	ϕ	²	1101
E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■	1110
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	¤	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

2.4.2 LQ mode

a) Epson Italics Character Set

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	NUL		SP	0	@	P	`	p	NUL		SP	*0*	*@*	*P*	`	*p*	0000
1		DC1	!	1	A	Q	a	q		DC1	*!*	*1*	*A*	*Q*	*a*	*q*	0001
2		DC2	"	2	B	R	b	r		DC2	*"*	*2*	*B*	*R*	*b*	*r*	0010
3		DC3	#	3	C	S	c	s		DC3	*#*	*3*	*C*	*S*	*c*	*s*	0011
4		DC4	$	4	D	T	d	t		DC4	*$*	*4*	*D*	*T*	*d*	*t*	0100
5			%	5	E	U	e	u			*%*	*5*	*E*	*U*	*e*	*u*	0101
6			&	6	F	V	f	v			*&*	*6*	*F*	*V*	*f*	*v*	0110
7	BEL		'	7	G	W	g	w	BEL		*'*	*7*	*G*	*W*	*g*	*w*	0111
8	BS	CAN	(	8	H	X	h	x	BS	CAN	*(*	*8*	*H*	*X*	*h*	*x*	1000
9	HT	EM	)	9	I	Y	i	y	HT	EM	*)*	*9*	*I*	*Y*	*i*	*y*	1001
A	LF		*	:	J	Z	j	z	LF		*	*:*	*J*	*Z*	*j*	*z*	1010
B	VT	ESC	+	;	K	[	k	{	VT	ESC	*+*	*;*	*K*	*[*	*k*	*{*	1011
C	FF		,	<	L	\	l	¦	FF		,	*<*	*L*	**	*l*	*¦*	1100
D	CR		-	=	M	]	m	}	CR		-	*=*	*M*	*]*	*m*	*}*	1101
E	SO		.	>	N	^	n	~	SO		.	*>*	*N*	*^*	*n*	*~*	1110
F	SI		/	?	O	_	o	DEL	SI		*/*	*?*	*O*	*_*	*o*	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

b) Epson Graphics Character Set

Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	NUL		SP	0	@	P	`	p	Ç	É	á		└	╨	α	≡	0000
1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±	0001
2		DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥	0010
3		DC3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤	0011
4		DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠	0100
5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡	0101
6			&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷	0110
7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈	0111
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°	1000
9	HT	EM	)	9	I	Y	I	y	ë	Ö	⌐	╣	╔	┘	θ	•	1001
A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·	1010
B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√	1011
C	FF		,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	n	1100
D	CR		-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²	1101
E	SO		.	>	N	^	n	~	Ä	Pt	«	╛	╬	▐	ε	■	1110
F	SI		/	?	O	_	o	DEL	Å	ƒ	»	┐	╧	▀	∩	SP	1111
	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111	Binary No.

c) International Character Set

Hex / Dec / Country		23 35	24 36	40 64	5B 91	5C 92	5D 93	5E 94	60 96	7B 123	7C 124	7D 125	7E 126	A3 163	A4 164	C0 192	DB 219	DC 220	DD 221	DE 222	E0 224	FB 251	FC 252	FD 253	FE 254
0	U.S.A.	#	$	@	[	\	]	^	`	{	¦	}	~	#	$	@	[	\	]	^	`	{	¦	}	~
1	France	#	$	à	°	ç	§	^	`	é	ù	è	¨	#	$	à	°	ç	§	^	`	é	ù	è	¨
2	Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
3	U.K.	£	$	@	[	\	]	^	`	{	¦	}	~	£	$	@	[	\	]	^	`	{	¦	}	~
4	Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì	#	$	@	°	\	é	^	ù	à	ò	è	ì
7	Spain I	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8	Japan	#	$	@	[	¥	]	^	`	{	¦	}	~	#	$	@	[	¥	]	^	`	{	¦	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
12	Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
13	Korea	#	$	@	[	₩	]	^	`	{	¦	}	~	#	$	@	[	₩	]	^	`	{	¦	}	~
64	Legal	#	$	§	¤	´	¨	¶	¯	©	®	†	™	#	$	§	°	´	¨	¶	¯	©	®	†	™

1. PRINTER SETUP

1.1 Equipment Check

After unpacking, make sure the items below have been included:

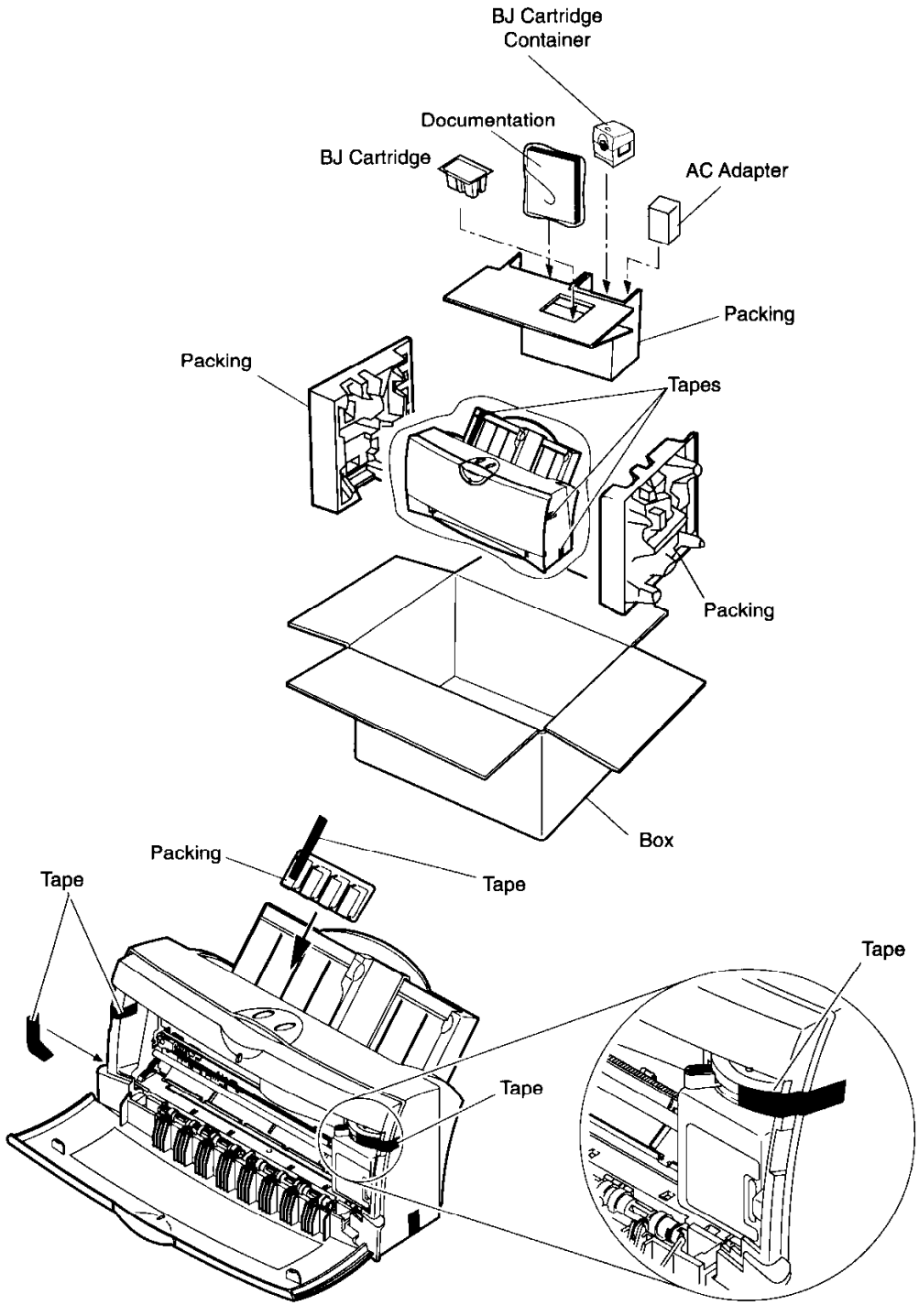


Figure 3-1 Packaging

1.2 Printer Dimensions

The printer's dimensions are shown below. Install the printer allowing enough space for it to be used with ease.

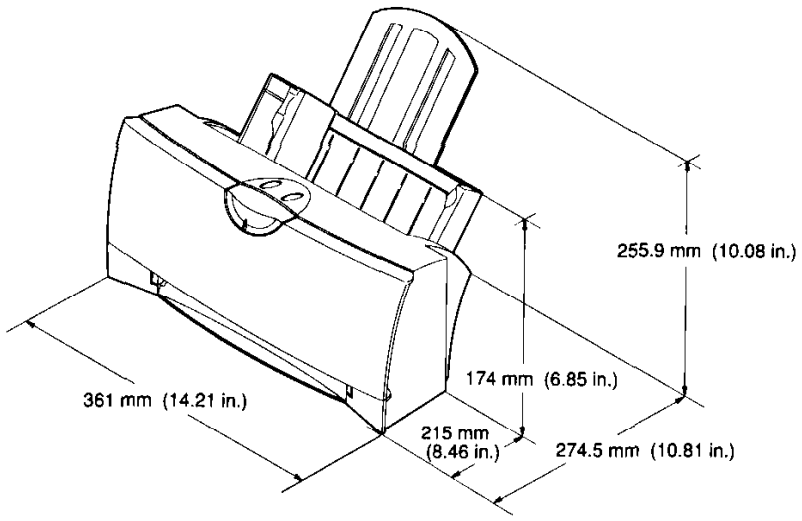


Figure 3-2 Printer Dimension

NOTE

- Do not place the printer in excessive heat or humidity.
- Operate the printer under the following conditions:
  Ambient temperature: 5°C to 35°C
  Relative humidity: 10% to 90% (no condensation)
- Do not place the printer in direct sunlight, or in areas with dramatic temperature changes.
- Do not place the printer near devices containing magnets or that generate a magnetic field.
- Place the printer on a level and stable surface.
- Do not place the printer where there is vibration.
- Keep the printer clean from dust.
- When moving the printer, hold both ends.

1.3 Setup Procedure

Set up the printer as follows.

1.3.1 Connecting the Interface cable

1) Make sure both the printer and the computer are off.
2) Connect one end of the parallel interface cable to the parallel interface connector on the back of the printer.
   After connecting the cable, fasten the locking pins to secure it.
3) Connect the other end of the interface cable to the parallel interface connector on the computer.

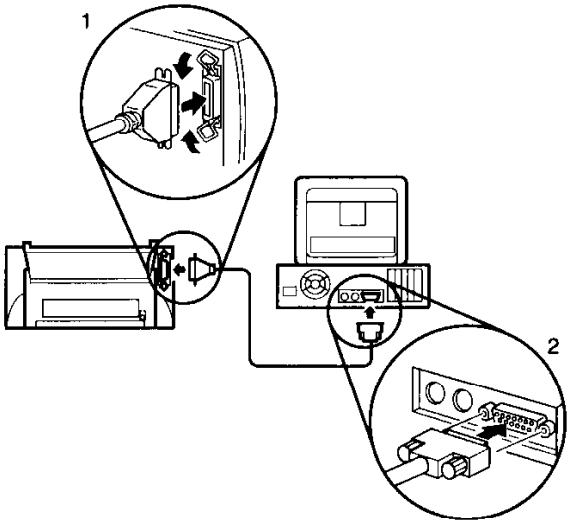


Figure 3-3 Connecting the Interface Cable

1.3.2 Connecting the DC power cord

Connect the DC power cord's plug to the printer's DC jack and plug in the AC adapter into a power outlet.

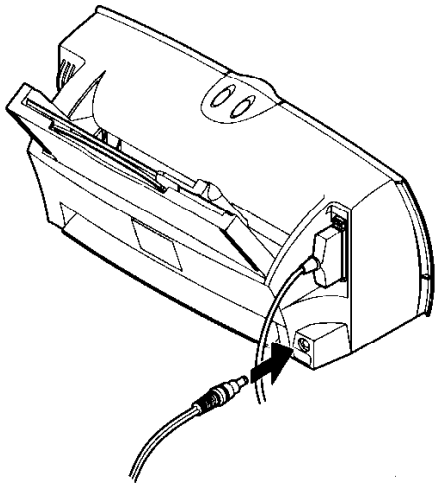


Figure3-4 Connecting the DC Power Cord

1.3.3 Installing the BJ cartridge

There are three types of cartridges, either of which can be installed in the printer: two color BJ cartridge and black BJ cartridge.

1) Removing the BJ cartridge protectors

Take out the BJ cartridge from the package, then remove the cap and tape on the nozzles as shown in the figure.

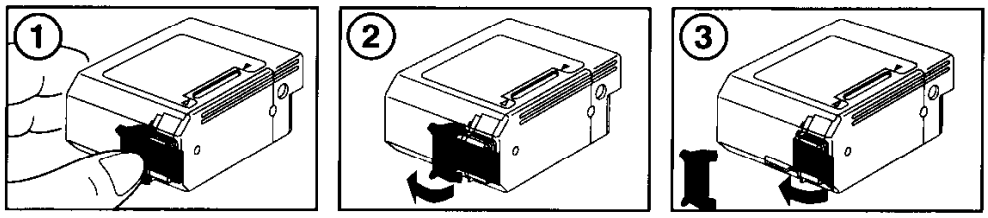


Figure 3-5 Removing the BJ Cartridge Protector

CAUTION

Do not reuse the cap and tape. It can cause clogging of the nozzles or mixing the ink colors.
Do not touch the nozzles when removing the tape. Scratching the head face and the ink contamination may result in poor printing.
After removing the cap and tape from the BJ cartridge, do not shake the BJ cartridge to prevent the ink from splashing out.

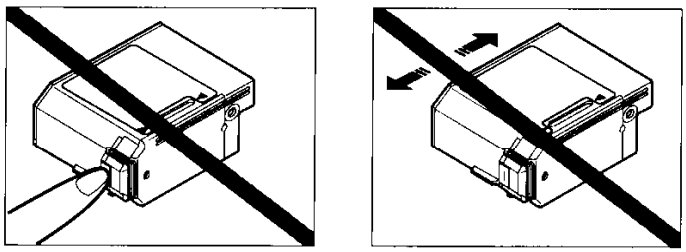


Figure 3-6 BJ Cartridge Handling Precautions

2) Installing the BJ cartridge

Open the printer's front cover and flip up the cartridge lock lever. Attach the BJ cartridge to the carriage and push down the cartridge lock lever to lock the BJ cartridge in place.

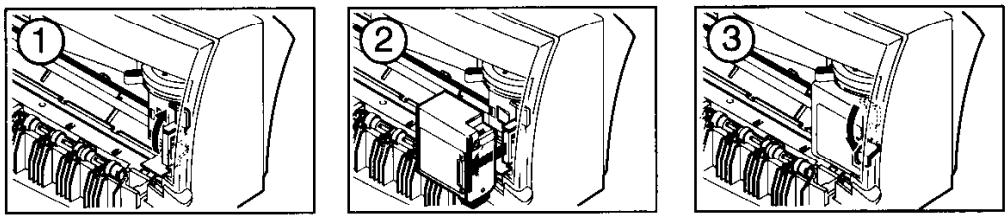


Figure 3-7 BJ Cartridge Installation

CAUTION

There are four types of BJ cartridges that can be installed in the printer: BC-01, BC-02, BC-05 and BC-06 photo. To ensure optimum printer performance, use the BC-02, BC-05 or BC-06 photo. It is not recommended to use the BC-01 as they may cause poor print quality. Using the BC-01 will not damage the printer or the cartridge.

1.3.4 BJ cartridge container

A BJ cartridge container for storing the BJ cartridge is packed with the printer. Always store BJ cartridges which have been removed from the printer in the BJ cartridge container. One color BJ cartridge or one black BJ cartridge can be stored in the box.

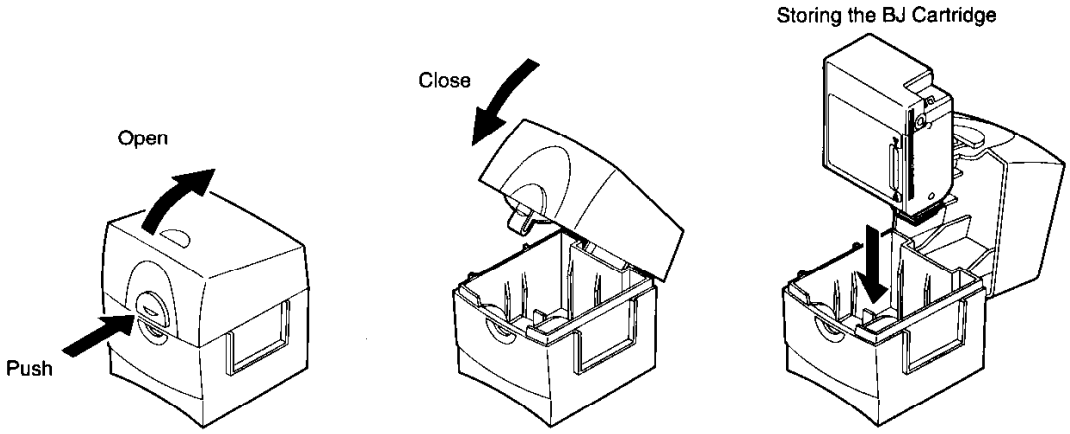


Figure 3-8 BJ Cartridge Container

1.4 Turning the Printer On/Off

1.4.1 Turning the printer on

When the DC power cord is plugged in and the *POWER* button is pressed down, the printer is powered on with a beeper. The printer will then perform the initial operation, blinking the *POWER/ERROR* indicator in green.

If a BJ cartridge is not installed when the printer is turned on, the beeper sounds after the initial operation again, and the *POWER/ERROR* indicator blinks green to indicate that a BJ cartridge must be installed.

After installing the BJ cartridge, when the printer is turned on, the cleaning operation is automatically performed, blinking the *POWER/ERROR* indicator in green.

1.4.2 Turning the printer off

To turn off the printer, press the *POWER* button. When the printer is turned off, it executes a power-off operation to cap the BJ cartridge. The *POWER/ERROR* indicator does not turn off during this operation. When the power-off operation is complete, the *POWER/ERROR* indicator turns off. Make sure the *POWER/ERROR* indicator is off, before disconnecting the DC power cord.

Never turn off the printer by disconnecting the DC power cord without pressing the *POWER* button. Otherwise, the printer is turned off before the head is capped properly. If the head is not capped, the ink may leak or dry out in the nozzles.

When the *POWER* button is pressed to turn off the printer, the power-off operation to cap the BJ cartridge is executed.

If the *POWER* button is pressed down during cleaning operation, the head is capped and the printer is powered off after the cleaning operation is completed. Any error occurring after the power-off operation starts is ignored.

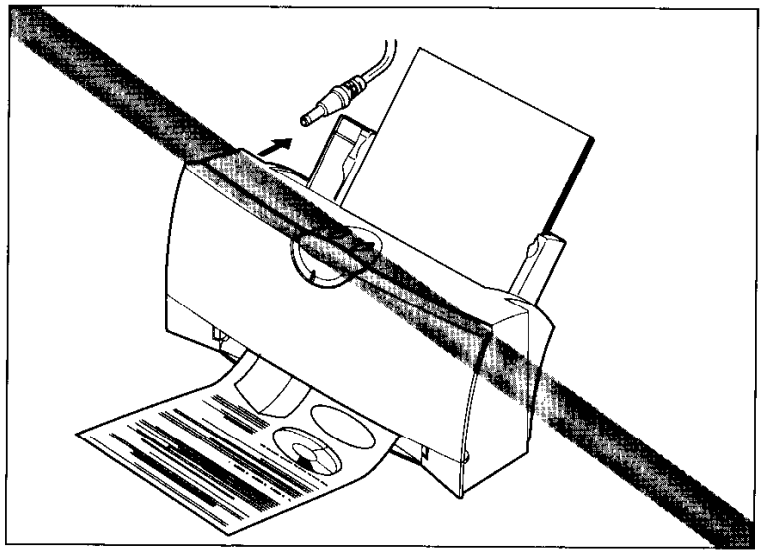


Figure 3-9 Do not turn off the printer without pressing the POWER button first.

1.5 Paper Settings

For optimum printing, the printer has various paper settings to suit various types of paper.

When paper exists in both the cut sheet feeder and the manual feeding slot, paper in the manual feeding slot is given priority.

1) Cut sheet feede

TABLE 3-1 QUICK REFERENCE FOR SETTING

Media	Thickness Lever	Paper Support	Paper Feed	
			Method	Limit
Plain paper	Left	Up	Auto	10 mm
Coated paper	Left	Up	Auto	10 mm
Envelopes	Right	Up	Auto	10 envelopes
Transparencies	Left	Up	Auto	50 sheets
Back Print Film	Left	Up	Auto	10 sheets
Glossy Paper	Right	Up	Auto	1 sheet
Fablic sheet	Right	Up	Auto	1 sheet

2) Manual feeding slot

TABLE 3-2 QUICK REFERENCE FOR SETTING

Media	Thickness Lever	Paper Feed	
		Method	Limit
Plain paper	Left	Manual	1 sheet
Coated paper	Left	Manual	1 sheet
Envelopes	Right	Manual	1 envelope
Transparencies	Left	Manual	1 sheet
Back Print Film	Left	Manual	1 sheet
Glossy Paper	Right	Manual	1 sheet
Fablic sheet	Right	Manual	1 sheet
High Gloss Film	Left	Manual	1 sheet

1.6 Part Names and Functions

The different parts of the printer and their functions are shown below.

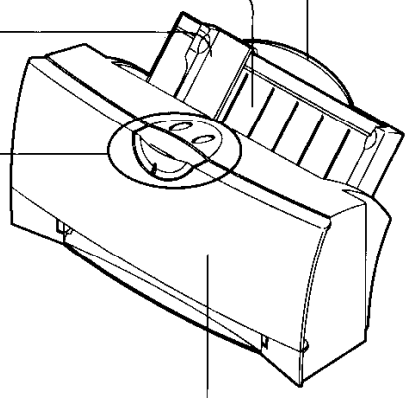
Paper Support
Supports the stack of paper loaded in the cut sheet feeder.
Before loading a stack of paper in the cut sheet feeder, extend the paper support first.

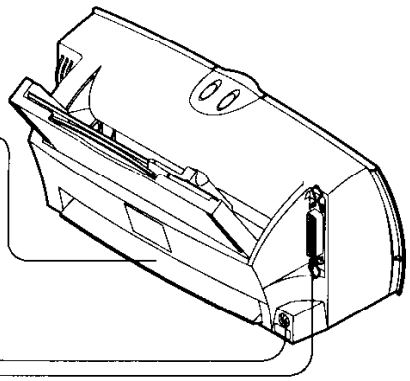
Cut Sheet Feeder
Holds up to a stack height of 10mm for automatic feeding.

Paper Guide
Aligns the cut sheets in the cut sheet feeder according to the paper size. A maximum paper width of 240 mm (9.5 in.) can be set.

Control Panel
See the next page.

Front Cover
Open to install or remove the BJ cartridge, set the paper thickness lever, or remove the jammed paper.





Manual feeding slot
Sheet can be manually fed singly.

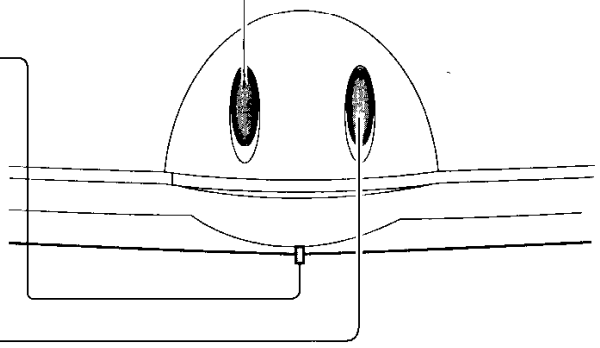
DC Inlet
Connects to the DC power cord.

Parallel Interface Connector
Connects to the paralell interface cable.

Figure 3-10 Part Names and Functions-1

POWER Button
Turns the printer on or off.

POWER/ERROR Indicator
Lights green when the printer is on.
Blinks green when print data is being processed.
Lights orange or blinks green and orange alternation when an error has ocurred.



RESUME Button
When there is no paper in the printer and this button is pressed, paper is picked-up. When the paper is inside the printer and the button is pressed , the paper is fed and ejected. When pressed for over two seconds, cleaning is excuted.

Figure 3-11 Part Names and Functions-2

Paper thickness lever

Adjusts the gap between the print head and paper to suit the thickness of the paper. There are two settings: left for plain paper, coated paper, transparencies, back print film or high gloss film; right for envelopes, glossy paper, fablic sheet or thick paper.

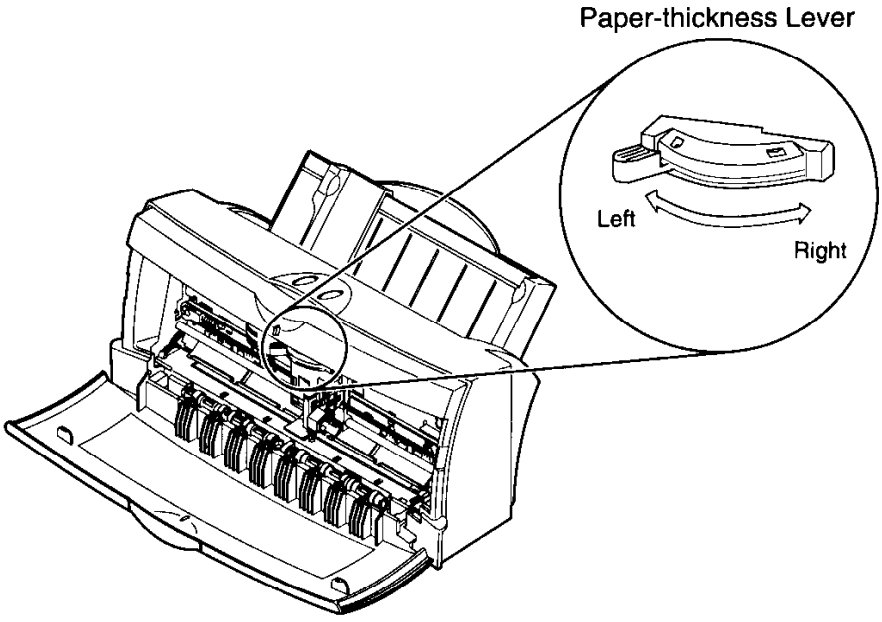


Figure 3-12 Paper-thickness Lever

2. TRANSPORTING THE PRINTER

When carrying or transporting the printer, keep the BJ cartridge installed in the printer or stored in the BJ cartridge container.
This prevents the ink from leaking and drying out in the nozzles.

2.1 Carrying the Printer

Before carrying the printer, follow the procedure below.

1) Press the *POWER* button to turn off the printer. When the power turns off, the *POWER/ERROR* indicator turns off.
2) Disconnect the interface cable.
3) Disconnect the AC adaptor power cord from the DC jack on the printer.
4) Unplug the AC adapter from the power outlet.
5) Check that the BJ cartridge is at the capping position (the right end of the printer). If the cartridge is not at the capping position, move the carriage to the capping position by hand.

CAUTION

Never turn off the printer by disconnecting the DC power cord without pressing the *POWER* button. Otherwise, the printer is turned off before the head is capped properly. If the head is not capped, the ink may leak or dry out in the nozzles.

2.2 Transporting the Printer

When transporting the printer, follow the procedure below.

1) Disconnect the interface cable and DC power cord as described above in *Part3*: 2.1 Carrying the Printer.
2) Check that the BJ cartridge is at the capping position (the right end of the printer). If necessary, move the carriage to the capping position by hand. Fasten the carriage to the right end of the printer with tape.
3) Repack the printer in its original box and packing materials.

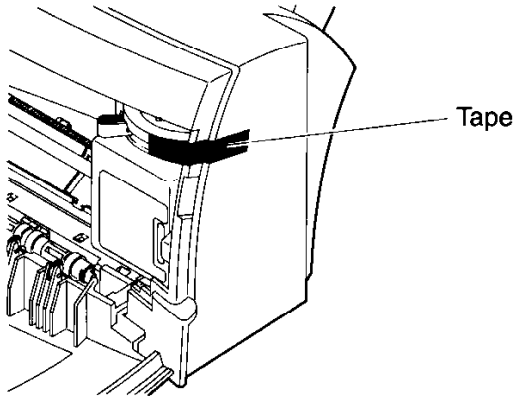


Figure 3-13 Fastening the Carriage

NOTE

If you do not have the original packing materials, use an ample amount of shock-absorbing materials.

3. PRINTER SERVICING FUNCTIONS

3.1 Error Indications

The indicator in combination with the beeper indicates the nature of errors.

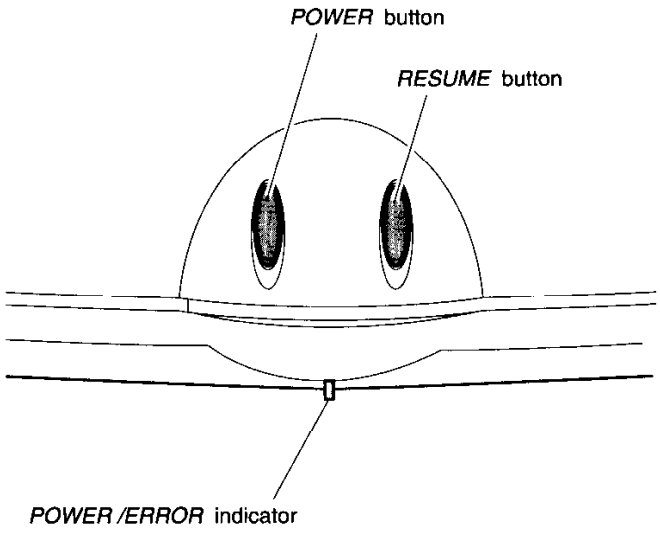


Figure 3-14 Control Panel

TABLE 3-3 ERROR DISPLAY

State	POWER/ERROR	Beeper
[Recoverable by customers]		
Paper pick-up error	Light orange	Once
Paper jam	Light orange	Twice
[Unrecoverable by customers]		
ROM error	Blinks orange and green alternately	Once
RAM error	Blinks orange and green alternately	Twice
BJ cartridge-out error	Blinks orange and green alternately	3 times
Home position error	Blinks orange and green alternately	4 times
Waste ink full error	Blinks orange and green alternately	5 times
Temperature sensor error	Blinks orange and green alternately	6 times
Print position correction error	Blinks orange and green alternately	7 times
Cleaning error	Blinks orange and green alternately	10 times

The errors listed in Table 3-2 are described below.

- User-correctable errors (Correctable by removing the paper and pressing the *RESUME* button).
  1) **Paper pick-up error**
     Occurs when the paper cannot be fed properly.
  2) **Paper jam**
     Occurs when the printed paper cannot be delivered.

- User-uncorrectable errors. (Press the *POWER* button to turn off the power.)
  3) **ROM error**
     Occurs when the result of the ROM check during the initializing operation fails.
  4) **RAM error**
     Occurs when the result of the RAM check during the initializing operation fails.
  5) **BJ cartridge-out error**
     Occurs when the printer does not detect the BJ cartridge other than during BJ cartridge replacement.
  6) **Home Position Error**
     Displayed when the home position can not be detected.
  7) **Waste ink full error**
     Occurs when the "total waste ink amount" recorded by the EEPROM exceeds the prescribed limit.
  8) **Temperature sensor error**
     Occurs when the temperature sensor's (TH1) reading on the logic board is abnormal.
  9) **Print position correction error**
     Occurs when the print position can not be corrected.
  10) **Cleaning error**
     Occurs when the cleaning operation is not performed normally.

3.2 Function Settings

Printer functions cannot be set with the printer. Use the Windows driver or BJ setup utility program for MS-DOS to set the function settings.
The five default setting modes can be set with the *POWER* button while the printer is on.

3.2.1 Setting the default setting mode

The default setting mode can be set as follows:
When turning on the printer, hold down the *POWER* button until the beeper sounds the specified number of times. In this way, the following default setting modes can be set.

TABLE 3-4 DEFAULT SETTING MODES

Mode	Beeper	Remarks
USA/LQ	6 times	
USA/BJ	7 times	Factory default setting for USA and Canada model
Europe, Asia/LQ	8 times	
Europe, Asia/BJ	9 times	
Asia, UK/BJ	10 times	Factory default setting for the models excluding USA and Canada model

Function settings of each default setting mode.

TABLE 3-5 DEFAULT SETTING MODE FUNCTION SETTINGS

	USA /LQ	USA /BJ	Europe, Asia/LQ	Europe, Asia/BJ	Asia, UK /BJ
Control mode	LQ	BJ	LQ	BJ	BJ
Paper selection	LTR	LTR	A4	A4	A4
Print mode	HQ	HQ	HQ	HQ	HQ
Smoothing setting	Off	Off	Off	Off	Off
Download buffer setting	Off	Off	Off	Off	Off
Font selection	Roman	Courier	Roman	Courier	Courier
Code page selection	437	437	437	850	437
Page length setting	22"	11"	22"	12"	12"
Character set setting	Graphics	Set1	Graphics	Set2	Set2
Text scale function	Off	Off	Off	Off	Off
Automatic line feed	CR	CR	CR	CR	CR
Automatic carriage return (BJ only)	...	LF	...	LF	LF
AGM setting (BJ only)	...	Off	...	Off	Off
International character setting (LQ only)	USA	...	USA	...	...

3.2.2 BJ setup utility program

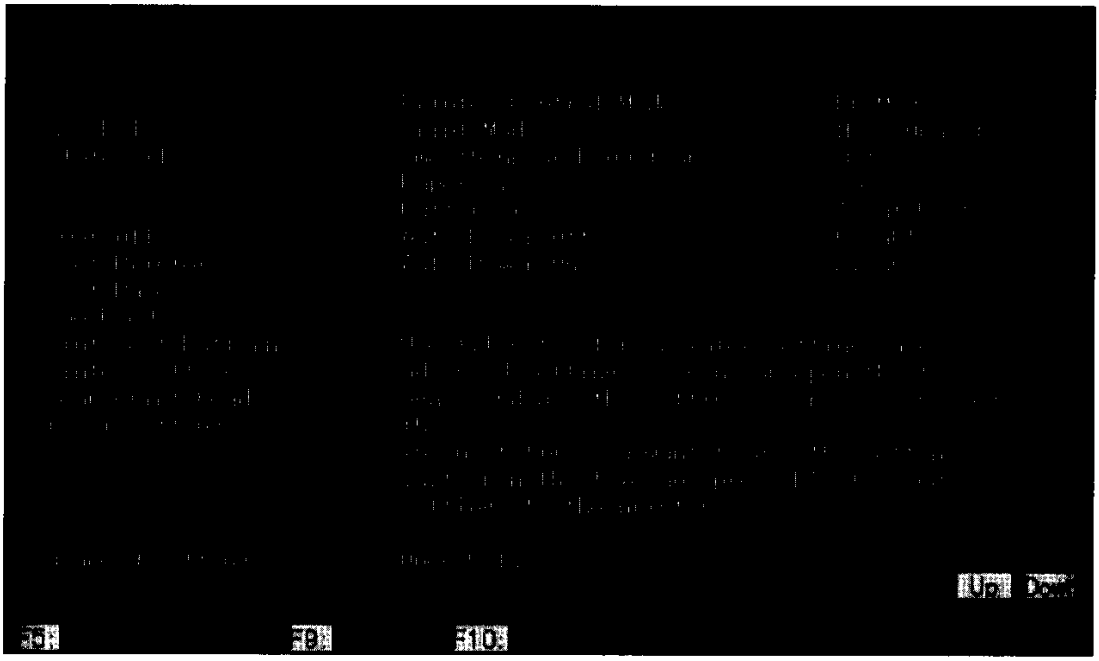


Figure 3-15 BJ Setup Utility Program (Sample)

Function settings which can be set with the BJ setup utility program.
Here is a quick summary of the BJ setup utility program features. For details, type BJ on the command line to start the utility program and scroll through the on-line help.

Advanced Settings
Include all the settings for either BJ mode or LQ mode. The advanced settings are all on the second screen of the BJ setup utility program.

AGM
Turns alternate graphics mode (AGM) on and off for BJ mode. Turn on AGM for IBM Proprinter X24E emulation.

Auto Carriage Return
Sets how the printer performs a carriage return in BJ mode.

Auto Line Feed
Sets how the printer does a line feed in BJ mode or LQ mode.

Auto Power Off
Sets the printer to turn itself off automatically when it is not receiving data.

Buffer Size (*1)
Allows you to change the allocation of available space in the buffer.

Character Set
Code pages and character sets may vary according to the make of the computer and printer. For BJ mode, select Character Set 1 or Set 2. For LQ mode, Epson Italic or Graphics Set can be selected.

Clean Print Head
Cleans the BJ cartridge print head. If white streaks or other flaws appear on the printed page, clean the print head.

Code Page
Allows you to select a code page for either BJ or LQ mode. Code pages are tables that show how characters, symbols, and numbers are coded.

Default table
One set of defaults from a list can be selected. Each set is named by country and control mode. For example, USA (LQ) or USA (BJ) can be selected.

Delete File
Deletes a file and the settings it holds. Delete files that are no longer required.

Eject Page
Ejects the paper or other media currently loaded in the printer.

Font Typeface
Allows the selection of one of 5 typefaces: Roman, Gothic, Courier, Prestige, Script for either BJ or LQ mode. This setting is ignored when the software application specifies a font.

International C.S.
Allows the selection of a character set, characters and symbols specific to each country for the LQ mode.

Line Feed
Sends a line feed (LF) instruction to the printer and the printer feeds the loaded sheet by one line.

Open File
Opens a saved file and retrieves the printer and advanced settings that it holds. After opening the file, press F10 to send the settings to the printer and close the BJ setup utility program.

Page Length
Sets the page length for BJ or LQ mode.

Paper Size
Sets the paper size. Selections include A4, Letter, #10 Envelope (3.4 mm), DL Envelope (6.2 mm).

Power Off
Turns off power to the printer.

Print Mode
Sets the print mode for HQ (high quality), HS (high speed).

Print Test Patterns
Prints a test pattern so that printer operations with the new settings can be checked. Before executing this command, be sure the printer can load A4 or Letter-size paper. Demonstration of printer features can be printed, Test Print A (repeating ripple pattern), and a Nozzle Pattern Print.

Printer Control Mode
Sets the emulation mode for the printer: BJ mode, LQ mode, Automatic mode.

Printer Port
Normally, your printer is attached to the first parallel port, LPT1. If you connect your printer to a different port, make a selection here: LPT1, LPT2, LPT3.

Printer Settings
Prints a list of all the current printer settings. Be sure to use Letter-size or A4 paper to print this list.

Reset Printer
Takes the new printer and advanced settings you have just made and stores them as the new default settings for the printer.

Save File
Saves a file with the settings you have just made in the menus.

Smoothing or reduction (*)
You can select Smoothing or Reduction. Smoothing removes the ragged edges that you see on characters and curved lines. These so called "jaggies" are caused by a stair-stepping effect caused by assembling characters and lines with individual dots when they are printed. Reduction prints at 1/2 or 2/3 the normal print size.

Text Scale Mode
Provides compatibility with software that assumes 66 lines will fit on each page for either the BJ mode or the LQ mode.

* The Buffer size and smoothing / reduction features cannot be used when the Color Cartridge BC-05 or BC-06 photo is installed.

3.3 Cleaning the BJ Cartridge

3.3.1 Cleaning procedure

Turn on the printer. Hold down the *RESUME* button until the beeper sounds twice. The cleaning starts when the *POWER/ERROR* indicator blinks green. When the cleaning is completed, the blinking stops. The cleaning time is approximately 15 seconds.

After the cleaning, execute a test printout of the nozzle check pattern to check the printing quality. (With the printer turned on, hold down the *POWER* button until the beeper sounds four times, then release the button to conduct the off-line test. The test stops when the *RESUME* button is pressed on.

Also, the printer cleans the BJ cartridge automatically as follows:

1) When the printer is turned on with the power button for the first time after the power cord has been connected.
2) After the BJ cartridge is replaced.
3) When the power is turned on and it has been 72 hours since the last time the head was cleaned.
4) Before the printing operation is performed and it has been 72 hours since the last time the head was cleaned.
5) After printing a prescribed number of dots, if a cleaning operation has not been performed.

3.4 Self-Test Printout

This printer has built-in self-test functions which can be executed without any connection to a computer. The off-line, self-test operations are described below. When turning on the printer, hold down the *POWER* button until the beeper sounds the specified number of times, then release the button. When the *RESUME* button is pressed or when the printer is turned off the self-test printout stops even if it is being printed.

TABLE 3-6 SELF-TEST PRINT MODES

Printout Mode	Beeper	Pages printed
Demonstration print	Once	Continuous printing
Printer status information print	Twice	1 page *
ASCII character print	3 times	Continuous printing
Nozzle check pattern	4 times	1 page *

* The self-test is automatically completed after printing one page.

NOTE

All self-test prints require Letter or A4-size paper. Using a smaller size paper for a self-test print will have part of the print printed directly on the platen.
Self-test prints are printed in accordance with the current printing settings (font, printing mode, etc.).

3.4.1 Demonstration print

The same patterns are printed for the color BJ cartridge and black BJ cartridge.

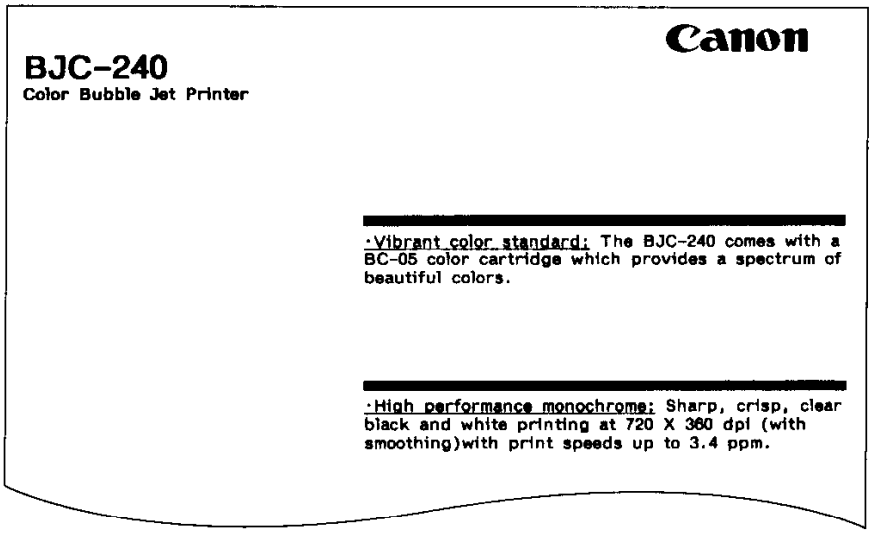

Canon
BJC-240
Color Bubble Jet Printer
·Vibrant color standard: The BJC-240 comes with a BC-05 color cartridge which provides a spectrum of beautiful colors.
·High performance monochrome: Sharp, crisp, clear black and white printing at 720 X 360 dpi (with smoothing)with print speeds up to 3.4 ppm.

Figure 3-16 Demonstration Print (Sample)

3.4.2 Printer status information print

Printer status information prints for the color BJ cartridge and black BJ cartridge are shown below.

·Printout with a black BJ cartridge BC-02 installed.

```
            Canon BJC-240 Printer Status Information

                                        >BJ<              >LQ<
 1. Printer Control Mode              : Enable            Disabled
 2. Paper Selection                   : LTR               <---
 3. Print Mode                        : High Quality      <---
 4. Smoothing                         : Disabled          <---
 5. Reduction                         : 1/1               <---
 6. Automatic Power on                : Disabled          <---
 7. Automatic Power off               : Disabled          <---
 8. Font                              : Courier           Roman
 9. Code Page                         : 437               437
10. Page Length                       : 11inch            22inch
11. Character Set                     : SET1              Graphics
12. Text Scale                        : Disabled          Disabled
13. Download Buffer                   : Disabled          <---
14. Receive Buffer Size               : 40KB              <---
15. Automatic Line Feed               : CR=CR             CR=CR
16. Automatic Carriage Return         : LF=LF               -
17. Alternate Graphics Mode           : Disabled            -
18. International Character Set       :   -               USA
19. Installed Cartridge Type          : BC-02 Black BJ Cartridge
20. Printer Preset Status             : USA-BJ            <---
```

·Printout with a color BJ cartridge BC-05 installed.

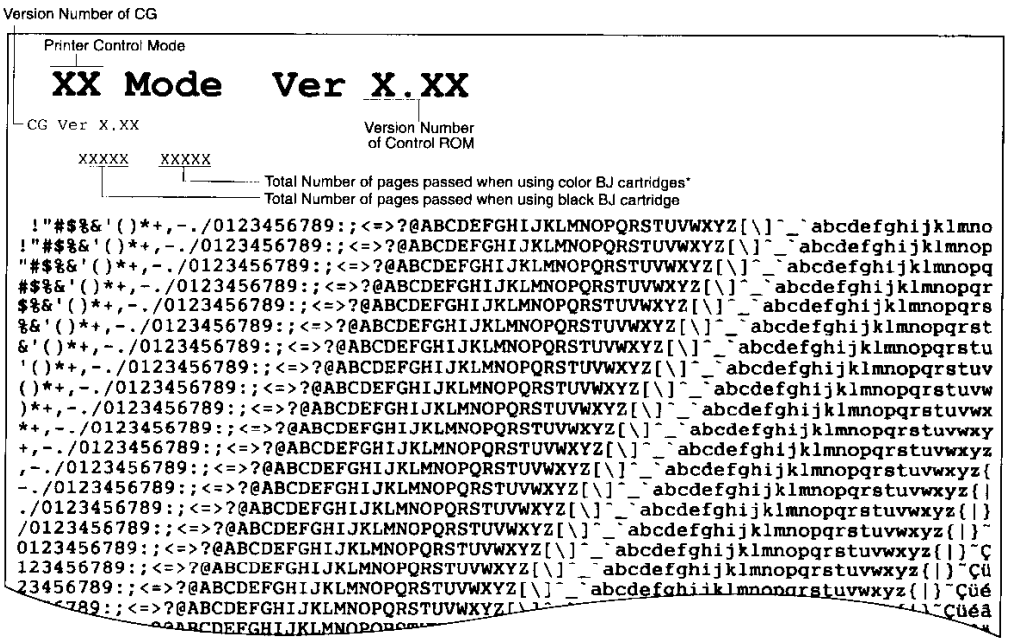
```
            Canon BJC-240 Printer Status Information

                                        >BJ<              >LQ<
 1. Printer Control Mode              : Enable            Disabled
 2. Paper Selection                   : LTR               <---
 3. Print Mode                        : High Quality      <---
 4. Smoothing                         : Disabled          <---
 5. Reduction                         : 1/1               <---
 6. Automatic Power on                : Disabled          <---
 7. Automatic Power off               : Disabled          <---
 8. Font                              : Courier           Roman
 9. Code Page                         : 437               437
10. Page Length                       : 11inch            22inch
11. Character Set                     : SET1              Graphics
12. Text Scale                        : Disabled          Disabled
13. Download Buffer                   : Disabled          <---
14. Receive Buffer Size               : 10KB              <---
15. Automatic Line Feed               : CR=CR             CR=CR
16. Automatic Carriage Return         : LF=LF               -
17. Alternate Graphics Mode           : Disabled            -
18. International Character Set       :   -               USA
19. Installed Cartridge Type          : BC-05 Color BJ Cartridge
20. Printer Preset Status             : USA-BJ            <---
```

Figure 3-17 Printer Status Information Print (Sample)

3.4.3 ASCII character print (Ripple pattern)

The printer control mode, control ROM version, and function settings in the header section are printed out as shown below. The same patterns are printed for the color BJ cartridges and black BJ cartridge.



* The total nember of pages with the color BJ cartridge is the sum of the number of pages printed using the color BJ cartridge and the color BJ cartridge photo.

Figure 3-18 ASCII Character Printout (Sample)

3.4.4 Nozzle check pattern

Make a printout with a BJ cartridge using all nozzles.

Execute cleaning if this test print shows signs of print defects such as no ejection, unclear or unstable etc. If the printing does not improve even after cleaning the cartridge five times or more, replace the cartridge.

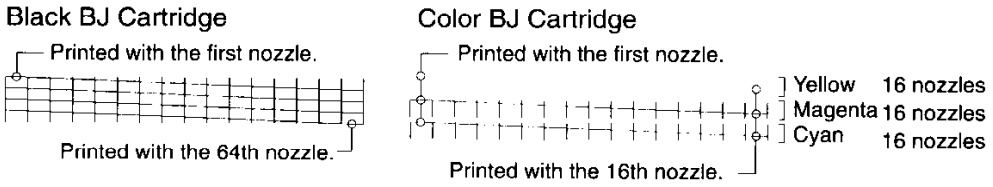


Figure 3-19 Nozzle Check Pattern

3.5 Hexadecimal Dump Test Printout

This printer can perform a hexadecimal dump test printout. The hexadecimal dump test printout the data sent from the computer to the printer (hexadecimal data). Turn on the printer and hold down the *POWER* button until the beeper sounds five times. Then release the button to execute the hexadecimal dump test printout. The printout stops when the printer is turned off. The hexadecimal dump test printout cannot be terminated with the *RESUME* button.

TABLE 3-7 HEXADECIMAL DUMP TEST PRINT

Test mode	Beeper
Hexadecimal dump test	5 times

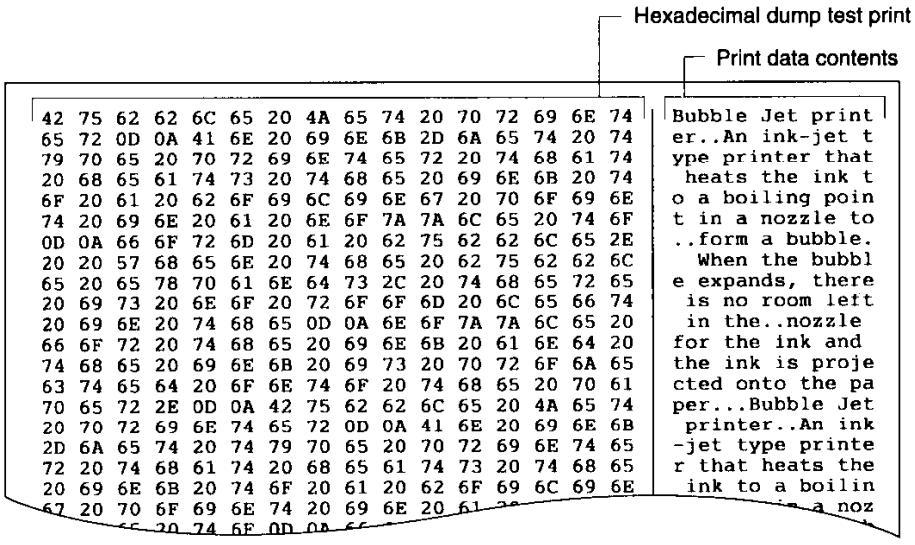


Figure 3-20 Hexadecimal Dump Test Printout (Sample)

3.6 EEPROM Reset

The EEPROM records various settings, the total number of pages printed and total waste ink amount for the black and color ink cartridges. The total number of pages printed and total waste ink amount can serve as a reference for how much the printer has been used.

The EEPROM must be reset when the logic board or the waste ink absorber is replaced, or when "Waste ink full" is provided.

For details, see *Part 5:* 4.3 Precautions for Logic Board/Waste Ink Absorber Replacement on page 5-5.

3.6.1 Resetting the EEPROM

Conduct the following Table setting, and the EEPROM data will be reset.
(The waste ink amount is set to 0, and it is impossible to set an arbitrary value.)

1. While holding down the *POWER* and *RESUME* buttons, insert the plug of AC adapter connected to the AC outlet into the printer, then release the buttons.
2. Press the *POWER* button again. (The long and short beeper sounds once, respectively.)
3. Press the *RESUME* button the specified number of times, referring to TABLE 3-7. (The beeper sounds once every time the *RESUME* button is pressed.)
4. The selected default setting data is written into the EEPROM, and simultaneously the data on the EEPROM is reset.

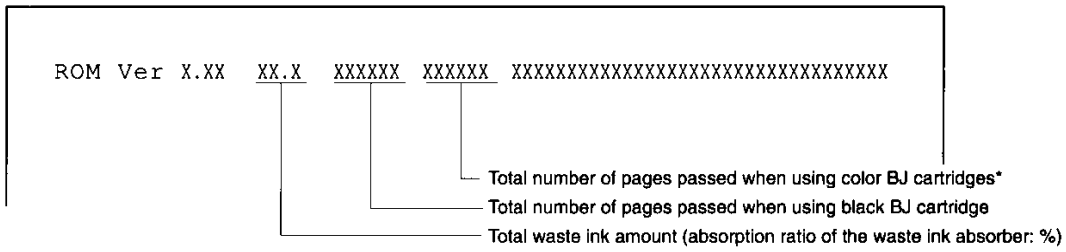
TABLE 3-8 EEPROM RESET AND DEFAULT SETTING

Mode	Beeper	Remarks
USA/LQ	1 time	
USA/BJ	2 times	Factory default setting for USA and Canada model
Europe, Asia/LQ	3 times	
Europe, Asia/BJ	4 times	
Asia, UK/BJ	5 times	Factory default setting for the models excluding USA and Canada model

3.6.2 Printing the EEPROM data

The following data recorded in the EEPROM can be printed out as described below:

1) Function setting:
   Execute Printer status information print of the self-test printout.
   See *Part3*: 3.4 Self-Test Printout on page 3-18.
2) Total sheets printed for the color and black ink cartridges:
   Execute the self-test print's ASCII character printout.
   See *Part3*: 3.4 Self-Test Print on page 3-18.
3) Total waste ink absorption amount:
   Print out the total waste ink absorption amount as follows:
   1. Install a black BJ cartridge in the printer. (The total waste ink absorption amount cannot be printed out with the color BJ cartridge installed.)
   2. While pressing the *POWER* button, connect the DC power cable to the printer's DC jack.
   3. While pressing the *RESUME* button and *POWER* button until the beeper sounds, then release the button.
   4. While pressing the *RESUME* button, turn on the printer. After the beeper sounds once, the total waste ink absorption amount will be printed out.


ROM Ver X.XX XX.X XXXXXX XXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Total number of pages passed when using color BJ cartridges*
Total number of pages passed when using black BJ cartridge
Total waste ink amount (absorption ratio of the waste ink absorber: %)

* The total nember of pages with the color BJ cartridge is the sum of the number of pages printed using the color BJ cartridge and the color BJ cartridge photo.

Figure 3-21 Sample Printout of EEPROM Data

Resetting the EEPROM will permanently erase all data contained.

1. OVERVIEW

1.1 Block Diagram

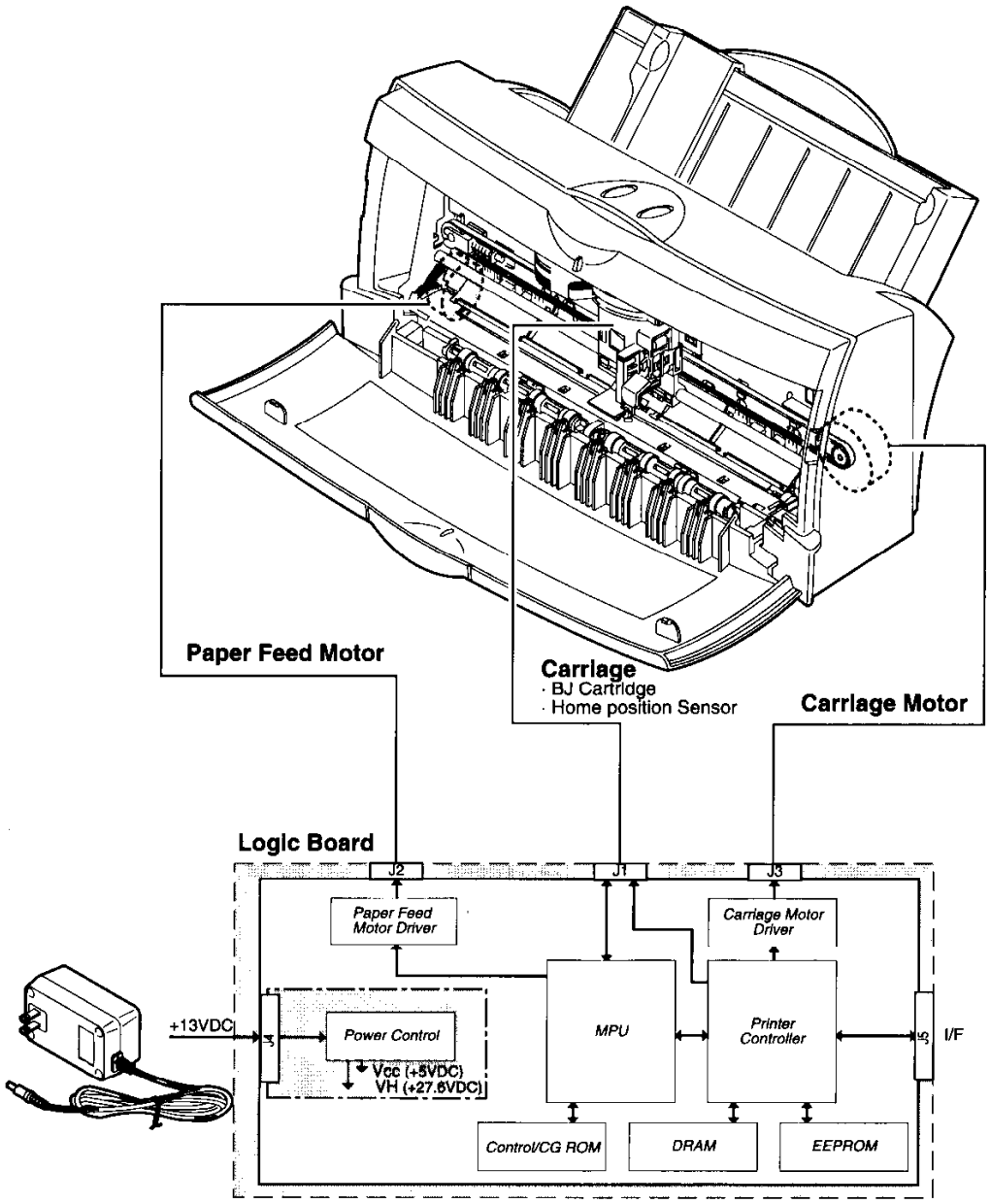


Figure 4-1 Block Diagram

1.2 Initialization Operation Flowchart

The initial flowchart below shows the process from when the printer is turned on to when it goes online.

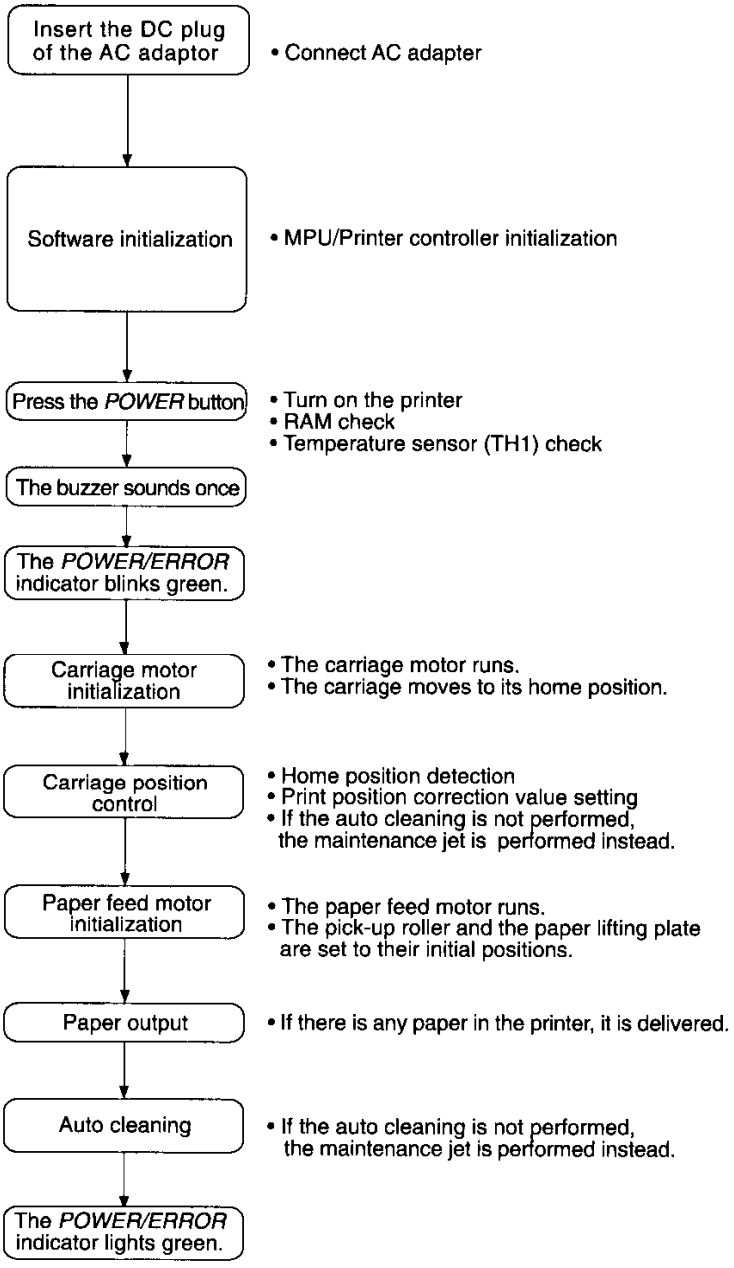

Insert the DC plug of the AC adaptor
• Connect AC adapter
Software initialization
• MPU/Printer controller initialization
Press the POWER button
• Turn on the printer
• RAM check
• Temperature sensor (TH1) check
The buzzer sounds once
The POWER/ERROR indicator blinks green.
Carriage motor initialization
• The carriage motor runs.
• The carriage moves to its home position.
Carriage position control
• Home position detection
• Print position correction value setting
• If the auto cleaning is not performed, the maintenance jet is performed instead.
Paper feed motor initialization
• The paper feed motor runs.
• The pick-up roller and the paper lifting plate are set to their initial positions.
Paper output
• If there is any paper in the printer, it is delivered.
Auto cleaning
• If the auto cleaning is not performed, the maintenance jet is performed instead.
The POWER/ERROR indicator lights green.

Figure 4-2 Initialization Flowchart

1.3 Printing Signal Flow

The printing signal flow from when the printer receives the printing data to when printing is executed is described below.

a) The printing data (including the control signals) output by the computer is received by the printer controller through the parallel interface, which is controlled by the printer controller on the logic board. Through the bus between the printer controller and DRAM, the printing data is stored in the DRAM's receive buffer area.

b) The printing data in the receive buffer is transferred to the MPU and separated into control commands and printing data based on the data stored in the control/CG ROM. The control commands are processed in the MPU.

c) The printing data is stored in the DRAM's print buffer.

d) When the printer controller receives the command from the MPU to start the printing, it receives the printing data (by DMA transfer) that was stored in the DRAM's print buffer.

e) The printer controller converts the printing data into serial data as printing drive signals and outputs the serial data to the bubble jet head. In the bubble jet head, the printing data is converted from serial signals to parallel printing data for one printing line. Printing is executed while the printer controller is controlled by the printing control signals.

f) The MPU controls the driving of the entire printing by controlling the printer controller, and motor drivers and detecting the status of the bubble jet head and printer.

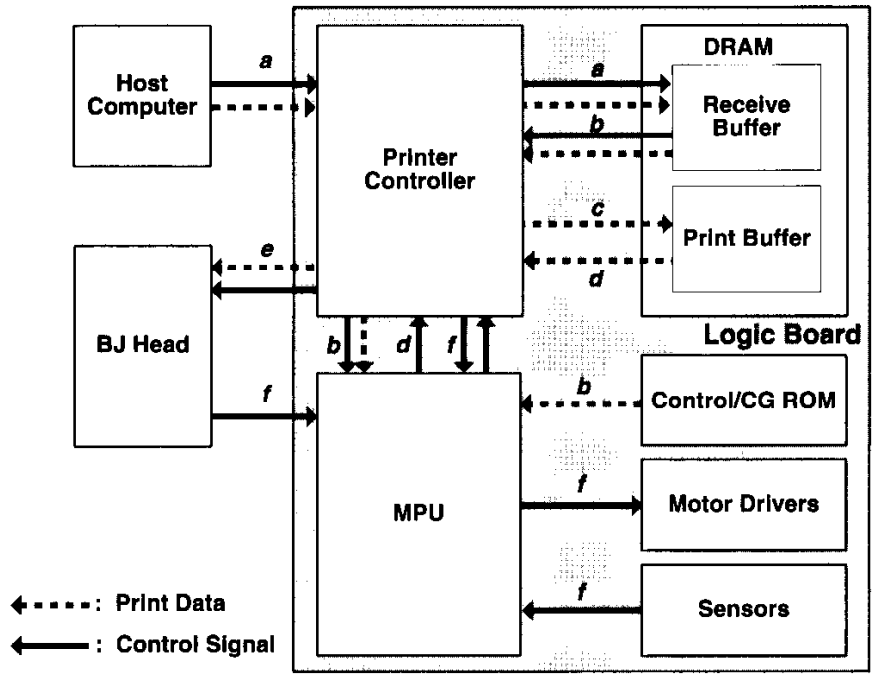


Figure 4-3 Printing Signal Flow

1.4 Print Drive

To eject ink from the head for printing, the printer controller generates control signals to the BJ head.
The control signals consist of the drive control signal for ejecting ink from the head's nozzles and the temperature control signal for adjusting the head's temperature so that the amount of ink ejected is uniform.
To achieve optimum printing, both these control signals are optimized by the printer controller and sent to the BJ head through the carriage ribbon cable.
The drive frequency varies depending on the printing mode and BJ cartridge type.

1.4.1 Printing drive control

a) Black BJ cartridge drive control

The driving control of 64 nozzles in the black BJ cartridge is executed by the matrix structure of 8 COM signals and 8 SEG signals. The COM signal connects the COM1 to COM8 circuits to the head drive power supply (VH) in order that the 64 nozzles are ready to print in units of eight nozzles. While the COM signal is connected to the head drive power supply, the SEG signal connects the SEG circuits (SEG1 to SEG8) for the even- and odd-numbered nozzles to the ground, and applies the heater voltage to the heater plate. The load on the AC adapter is reduced and ink charging delay is prevented by driving the head in steps.
The SEG signal has two pulses, pre-pulse and main pulse. The pre-pulse does not eject ink, but increases the head temperature to the appropriate value, and the main pulse ejects ink. The printer controls each pulse width to obtain the optimum print density according to the print speed and temperature.

b) Color BJ cartridge drive control

With exception of the following points, the head drive control of the color BJ cartridge is the same as that of the black BJ cartridge.
The nozzle configuration of color BJ cartridge is different from that of black BJ cartridge, and the COM 1 and 2 signals are used for driving the nozzle heaters for C, COM 4 and 5 signals for M and COM 6 and 7 for Y.
The color BJ cartridge has 16 nozzles each for Y, M, and C, whereas the black BJ cartridge has 64 nozzles for black only.

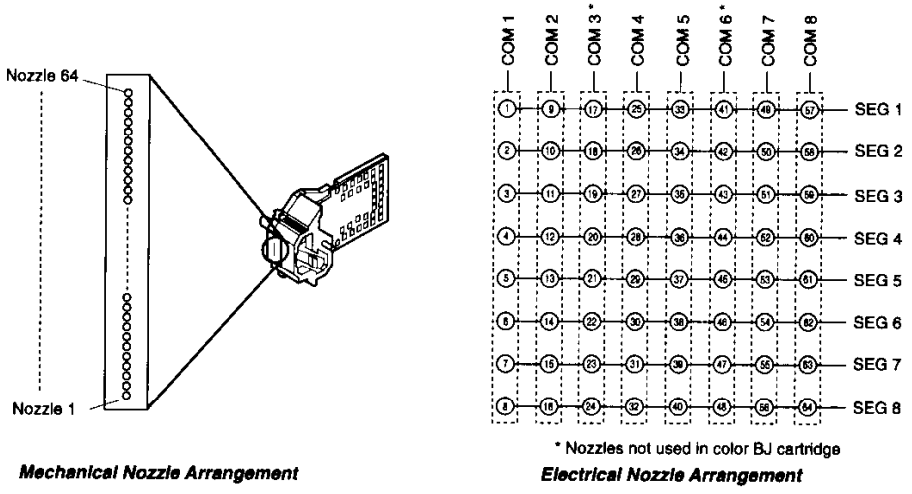
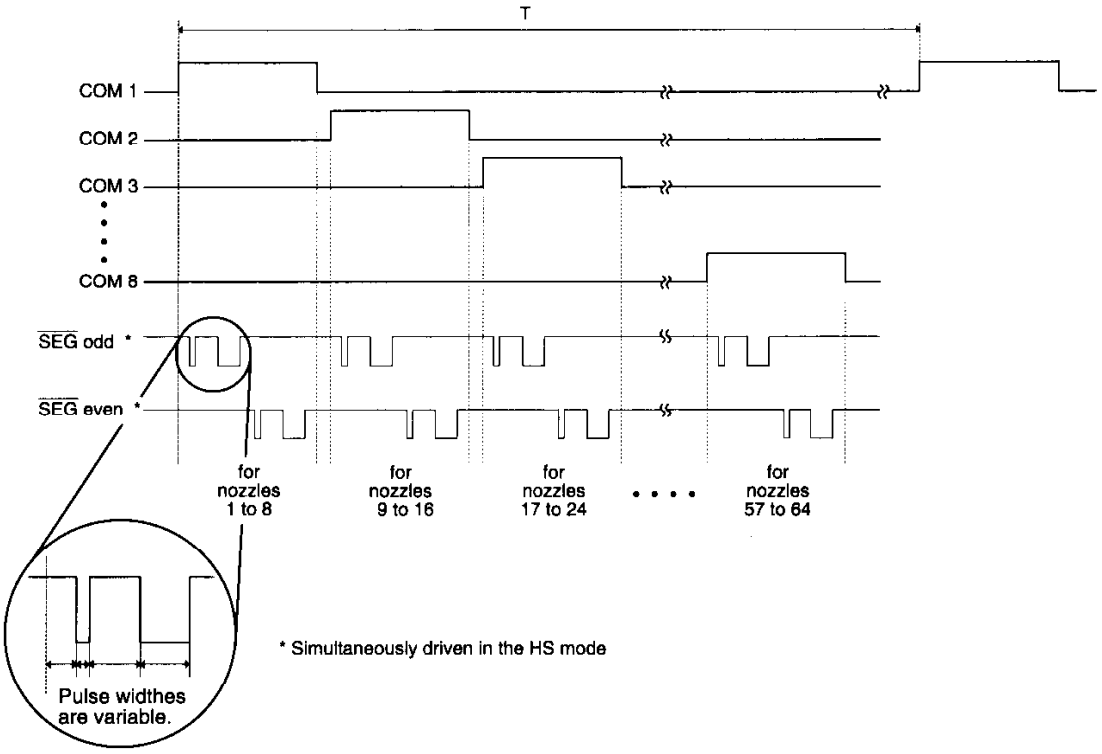


Figure 4-4 Nozzle Arrangement



"T" values are shown in the table below. Heater drive frequencies are in parentheses.

	Black BJ cartridge	Color BJ cartridge	Color BJ cartridge Photo
HS	112 µs (8.93 kHz)	112 µs (8.93 kHz)	——
HQ	136 µs (7.35 kHz)	136 µs (7.35 kHz)	——
720dpi/Smoothing	96 µs (10.4 kHz)	——	——
Photo	——	——	88 µs (11.4 kHz)

Figure 4-5 Print Signal

1.5 Power Off Operation Flow

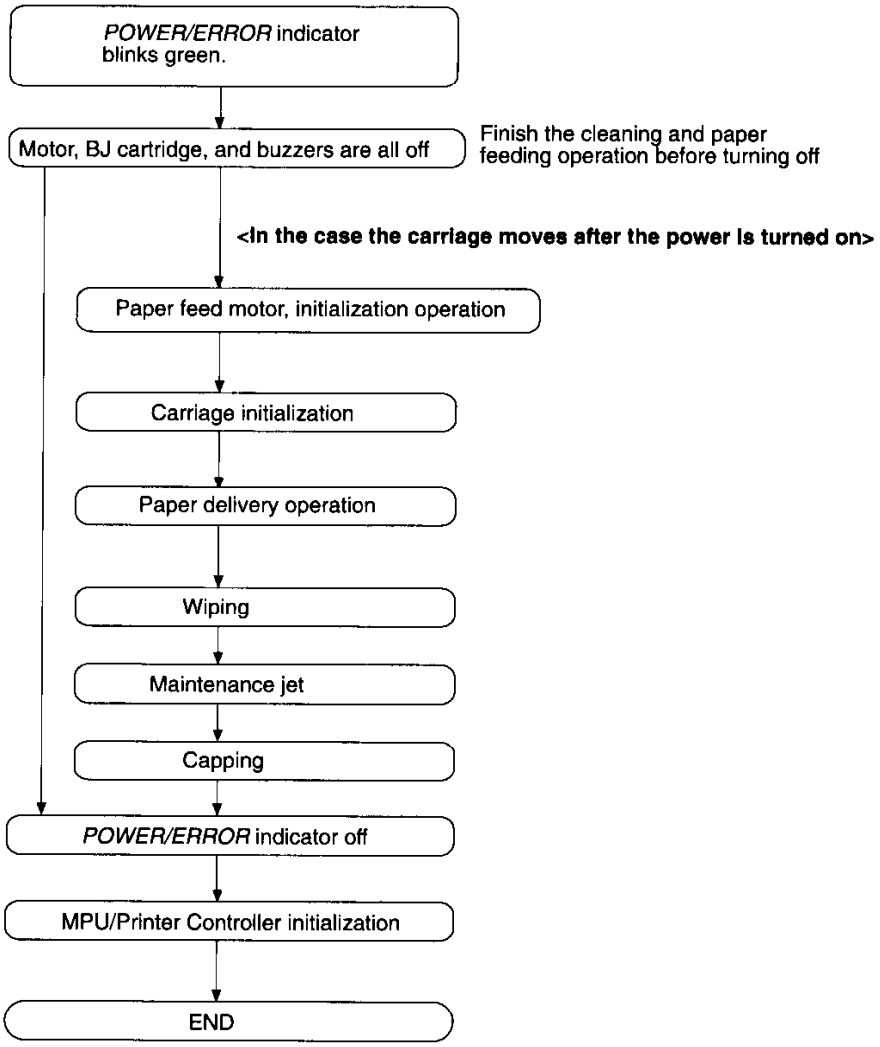


Figure 4-6 Power off Operation Flow

CAUTION

If the DC power cord or AC adapter is disconnected before the printer is turned off with the *POWER* button, the cartridge head might not be capped. In this case, reconnect the DC power cord, start up the printer again, then turn off the printer with the *POWER* button. The DC power cord or AC adapter may then be disconnected.

2. FIRMWARE

2.1 Interface

The printer supports compatible mode and nibble mode which are compatible with the bi-directional Centronics interface-standard (IEEE 1284).
The compatible mode is the same as the Centronics interface-standard protocol. The printer supports data transfer only in compatible mode. It does not support ECP mode which enables high-speed data transmission and reception.
In nibble mode, the printer supports only status data transfer to a host computer.

2.1.1 Compatible mode

The parallel interface for the compatible mode transfers data in 8-bit units. Data is transferred with the $\overline{\text{STROBE}}$, BUSY, and $\overline{\text{ACKNLG}}$ handshake signals.
When the printer receives the data (Data 1-8) and $\overline{\text{STROBE}}$ signal from the host computer and the $\overline{\text{STROBE}}$ signal is Low, the printer controller (which controls the parallel interface) outputs the BUSY signal and latches the data. After the BUSY signal is output, the printer controller sends the latched data from the DRAM bus to the receive buffer in the DRAM. After the data is completely written in the receive buffer in the DRAM, the printer controller outputs the $\overline{\text{ACKNLG}}$ signal and sets the BUSY signal to "Low." Then it waits for the next data input from the host computer.

BJ Mode / LQ Mode

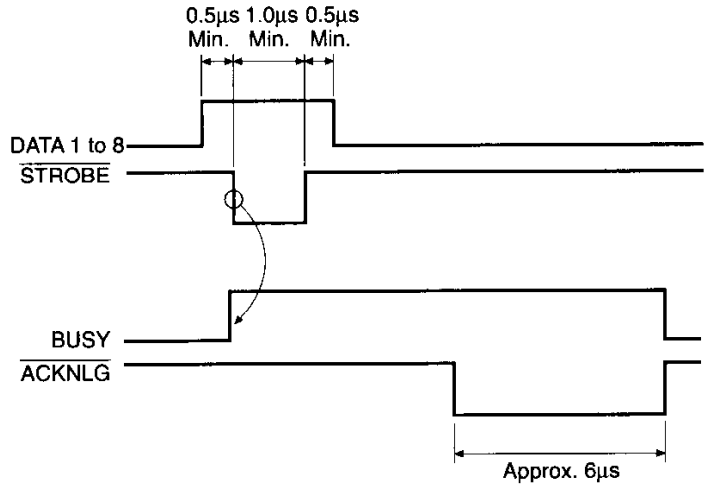


Figure 4-7 Interface Timing (Compatible Mode)

2.1.2 Nibble mode

In the nibble mode, the printer transfers data twice to the host computer in 4-bit units. The data is transferred with the Ptr Clk signal and Host Busy signal handshakes.

After the printer confirms that the Host Busy signal is low, it prepares 8-bit data, lowers the Ptr Clk signal and outputs the lower 4 bits along the control signal line. After the Ptr Clk signal is Low, the host computer receives the data and raises the Host Busy signal. Next, after the printer confirms that the Host Busy signal is Low for the second time, it outputs the upper 4 bits along the control signal line. If there is no data to be sent to the host computer after the Host Busy signal is High, the DataAvail signal becomes High and the printer stands by for the next data transfer.

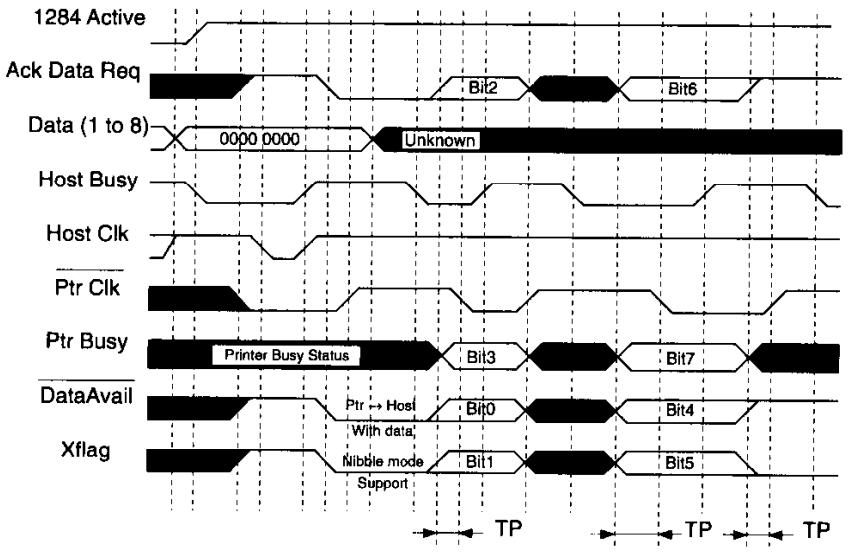


Figure 4-8 Interface Timing (Nibble Mode)

2.2 720 dpi Printing/Smoothing Feature

This features operates only with the Black BJ Cartridge BC-02.

2.2.1 Canon extension mode

In the Canon Extended mode, the printer driver creates 720 dpi data for the horizontal axis and sends it to the printer, resulting in high-quality printing. The printer driver smoothes the printed character's edges at 720 dpi along the horizontal axis. The 720 dpi data for the horizontal axis is sent to the printer and the edges are smoothed at a high resolution.

2.2.2 Emulation mode

The printed character's edges can be smoothed at a high resolution of 720 dpi along the horizontal axis. Dots along the character's edges are added or deleted for smoothing the edge. Along the horizontal axis, dots are also overlapped by a half-dot space. This eliminates jags and increases the equivalent horizontal resolution at twice.

This smoothing feature greatly improves low-resolution, 180 dpi characters. However, it does not give noticeable improvement to TrueType fonts and illustrations.

This feature is not available with the reduction setting.

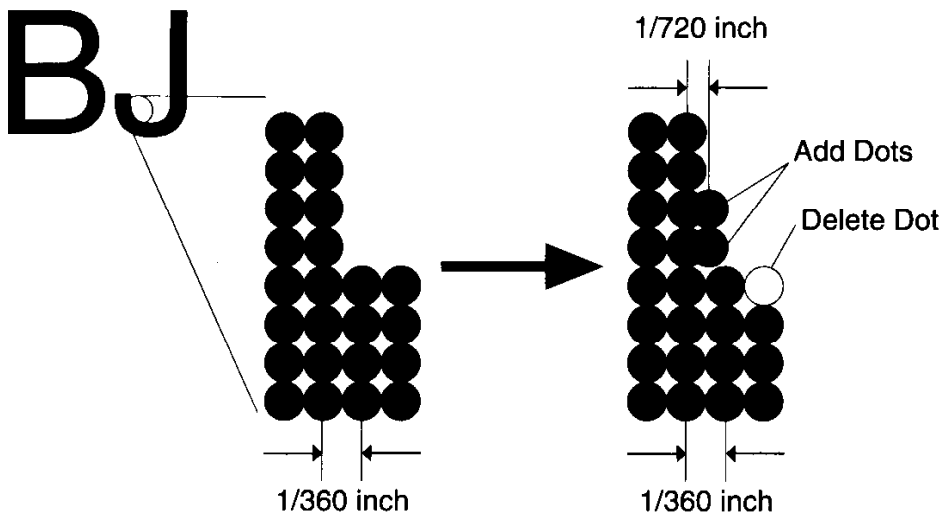


Figure 4-9 720 dpi Printing/Smoothing Feature

2.3 Printing Modes

2.3.1 Printing mode

Depending on the cartridge installed, the medium, the printing mode, the resolution, the printing data, etc., the printer varies the carriage movement, bubble jet head driving frequency, etc., to attain high-quality printing without any bleeding or shifting in the printout.

The smoothing function is available only when using the black BJ cartridge BC-02. When the 720 dpi printing/smoothing feature is used, the carriage feed pitch is set to 1/720 inch. Although this slows down the carriage speed, the bubble jet head's driving frequency (heat frequency) is increased so that the overall printing throughput decreases little.

When the monochrome printing is conducted using the color BJ cartridge BC-05, the composite black is used as a black color. The composite black is made from three colors of Y, M and C, and it is printed in 66.7% duty of each color, total approximately 200% duty. The boundary line is printed with 100% duty of each color, total 300% duty. This makes the black color look darker.

With the color BJ cartridge BC-06 photo installed, this printer prints pixels by dividing the pixel data into a maximum of 4-values (no printed, print 1 dot, print 2 dots, print 3dots). This method enables the printer to achieve high degree gradation printing. When printing with 2 dots, the second dot is printed in the 720 dpi position. When printing with 3 dots, the second dot is printed in the 720 dpi position while the third dot is printed on top of the first dot. When monochrome printing using the color BJ cartridge BC-06 photo, printing is conducted at a maximum total (C/Y/M) of 400% duty, but the boundary lines are not emphasized.

The printing method for the respective printing modes are listed below.

TABLE 4-1 PRINTING MODES AND HEATING METHODS

With a Black BJ Cartridge

Printing Mode	Carriage Movement	Number of Nozzles	Heat Frequency [*]
Fine	4 passes	16 nozzles	7.35KHz [7.35KHz]
HQ (Smoothing OFF)	1 pass	64 nozzles	7.35KHz [7.35KHz]
HQ (Smoothing ON)	1 pass	64 nozzles	10.42KHz [5.21KHz]
HS	1 pass	64 nozzles	8.93KHz [8.93KHz]

With a Color BJ Cartridge

Printing Mode	Carriage Movement	Number of Nozzles	Heat Frequency [*]
Fine	2 passes	8 nozzles	7.35KHz [7.35KHz]
HQ	1 pass	16 nozzles	7.35KHz [7.35KHz]
HS	1 pass	16 nozzles	8.93KHz [8.93KHz]

With a Color BJ Cartridge Photo

Printing Mode	Carriage Movement	Number of Nozzles	Heat Frequency [*]
Photo	2 passes	8 nozzles	11.4KHz [5.7KHz]

* [ ]: Carriage speed

2.3.2 High-duty printing mode

When high duty printing is conducted, the current consumption of the AC adapter will exceed the maximum rated current. To prevent this, the print duty is monitored and the printing is divided so as not to exceed the maximum rated current. This function works only when using the black BJ cartridge in the HQ mode.

2.4 Optimum Printing Direction Control

To prevent vertical misalignment of the printed characters, etc., when print data is printed continuously in the direction of the paper feed direction, printing is executed with the carriage moving from only one direction.

However, when printing in the paper feeding direction is not continuous, since vertical misalignment is not so noticeable, the printing direction is alternated so that printing is also executed from the opposite carriage direction. This improves the throughput.

If four or more successive null rasters are detected in the lower (in the direction of paper ejection) 24 nozzles for the printing data in the printer buffer during single-pass printing, printing is executed up to the null raster. From the null raster onward, printing is executed from the opposite carriage direction. From the next raster onward, printing is executed from the same carriage direction until the direction changes again. This function works only when using the black BJ cartridge in the Canon Extended mode.

2.5 Automatic Emulation Switching

The printer analyzes the control command received from the host computer and determines whether it is in BJ or LQ mode. The emulation mode is switched automatically. The BJ setup utility program can be used to turn on or off the automatic switching of the emulation mode.

Control command recognition

By recognizing the control command received from the host computer, the printer can determine which emulation mode to set. The printer determines the emulation mode when the control command is received at any of the following times: After the power is turned on and no printing data has been received, when no print data has been received for over 10 seconds, or when the printer has no print data.

Switching the emulation mode

The emulation mode is switched automatically at any of the following times:
When the printer has received over 512 bytes of data, when the data reception (even for data less than 512 bytes) has been interrupted for over 3 seconds, or when the power has been turned off before over 512 bytes of data is received or before over 3 seconds of data reception.

Upon shipment from the factory or when the EEPROM is reset, the automatic emulation switching function is set to "Invalid". After the setting is changed to "Valid", the last emulation mode is valid until the automatic emulation switching function works.

There are control commands with which the printer cannot determine the emulation mode to set. If the emulation mode set automatically is not the right one, use the BJ setup utility program or the manual default setting to cancel the automatic switching of the emulation mode and set the emulation mode manually.

3. PRINTER'S MECHANICAL SYSTEM

3.1 Overview

This section explains the printer's mechanical components.

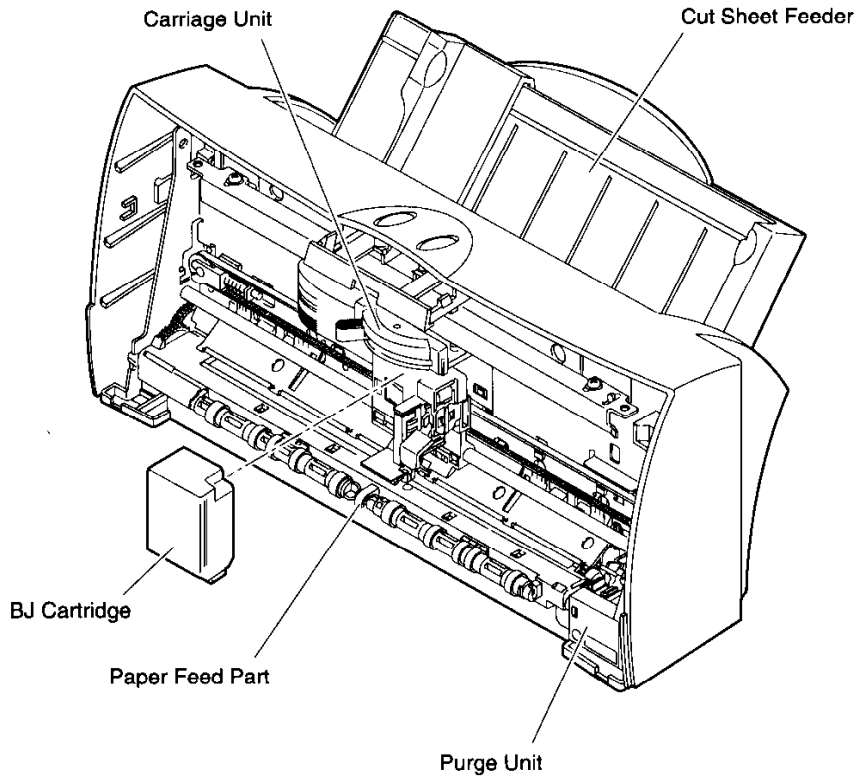


Figure 4-10 Printer Mechanical Configuration

3.1.1 Mechanical components

1) BJ cartridge

A black or one of 2 types of color BJ cartridge can be fitted into the printer. All these cartridges are ink-disposable.

2) Purge unit

Driven by the paper feed motor, the purge unit helps maintain high-quality printing by capping and wiping the BJ cartridge's bubble jet face. It enables the ink in the nozzles to be ejected easily.

When the printer is not in use, the purge unit caps the BJ cartridge's nozzles for protection.

3) Carriage unit

Driven by the carriage motor, the carriage moves horizontally across the paper. Through the carriage ribbon cable, the printing signals from the logic board are transmitted to the carriage-attached BJ cartridge.

By controlling the purge unit's slide lock pin, the carriage controls the engagement of the paper feed motor's drive power between the paper feed/purge unit and the sheet feeder.

4) Paper feed mechanism and sheet feeder

Driven by the paper feed motor, the paper feed mechanism rotates the feed rollers to move the paper in a vertical direction.

Plain paper, coated paper, transparencies, back print film, envelopes, etc., can be automatically fed when loaded in the built-in sheet feeder. One sheet at a time can be manually fed from the manual feeding slot on the back of the printer. Media is picked-up and fed into the paper feed unit with drive from the paper feed motor.

When paper is loaded in the both the cut sheet feeder and manual feed slot, priority is given to the manual feed slot.

When printing transparencies and back print film, remove each sheet after it is delivered. As they require more time for the ink to dry completely.

As this printer is fitted with a paper feed nob to manually feed paper, use the *RESUME* button for paper feed operations.

3.2 BJ Cartridge

3.2.1 Black BJ cartridge structure

The black BJ cartridge has a printing head equipped with 64 nozzles. The printing head and ink cartridge are built-in.

1) Side cover

This plastic cover is fixed to the cartridge body to prevent ink leaking from the ink sponge.

2) Ink sponge

This sponge is soaked with black ink. It is compressed and stored in the cartridge body.

3) Cartridge body

This is a plastic case which links the ink sponge with the bubble jet head unit via the ink filter.

4) Air Hole with Pressure Regulation Cap

As the ink is consumed, the pressure inside the cartridge decreases compared to the atmospheric pressure. This makes it more difficult for the ink to be supplied to the head. To prevent this, the ink cartridge has an air intake for maintaining a constant pressure inside the cartridge body.

5) Bubble jet head unit

As dictated by the printing signals received through the signal contact, ink is ejected through the 64 bubble jet nozzles.

6) Head cover

The plastic head cover protects the bubble jet head unit.

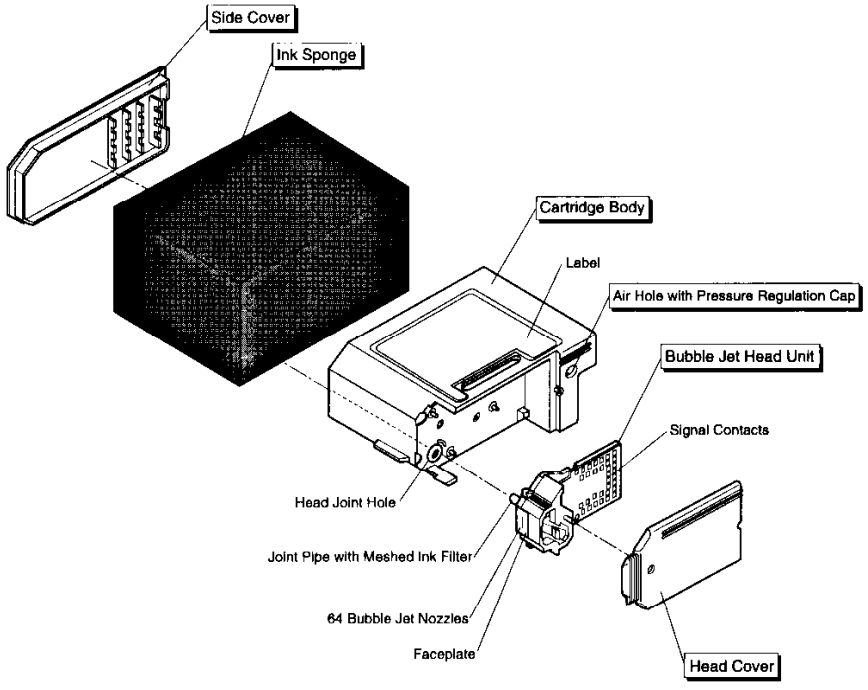


Figure 4-11 Black BJ Cartridge Structure

3.2.2 Color BJ cartridge structure

The color BJ cartridge has a printing head equipped with 64 nozzles through which the three ink colors are ejected (16 nozzles each for yellow, magenta, and cyan). The printing head and ink cartridge are built-in.

1) Side cover

This plastic cover is fixed to the cartridge body to prevent ink leaking from the ink sponge.

2) Ink sponges

Each color ink (yellow, magenta, cyan) is soaked in its respective sponge. The yellow, magenta, and cyan ink sponges are compressed and stored in the cartridge body.

3) Cartridge body

This is a plastic case which links the ink sponge with the bubble jet head unit via the ink filter.

4) Air Hole with Pressure Regulation Caps

As the ink is consumed, the pressure inside the cartridge decreases compared to the atmospheric pressure. This makes it more difficult for the ink to be supplied to the head. To prevent this, the ink cartridge has an air intake for maintaining a constant pressure inside the cartridge body.

5) Bubble jet head unit

As dictated by the printing signals received through the signal contact, ink is ejected through the 48 bubble jet nozzles.

6) Head cover

The plastic head cover protects the bubble jet head unit.

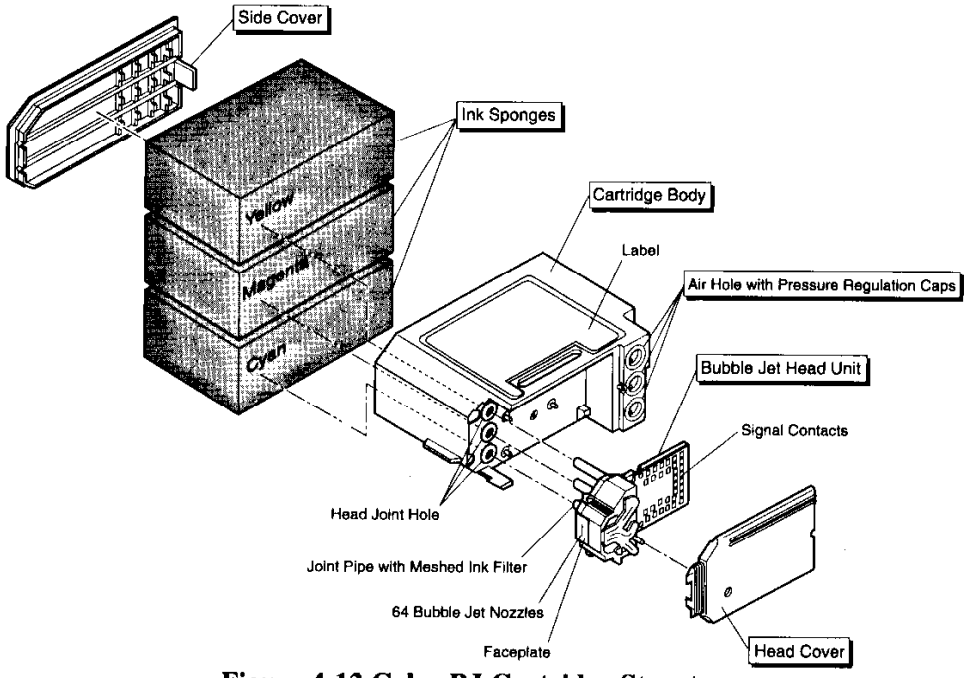


Figure 4-12 Color BJ Cartridge Structure

3.2.3 Bubble head unit structure

1) Bubble jet nozzles

The ink in the sponge passes through a mesh-type ink filter and flows to the bubble jet nozzles through the joint pipe.

When the head-driving current is supplied to the heater board, and multiple ink bubbles form. Eventually, only one ink bubble is formed. The head-driving current is turned off before the ink drop leaves the nozzle. The bubbling however continues with the residual heat and the ink drops are ejected from the nozzles.

After an ink drop is ejected, the nozzle is filled with ink supplied from the ink sponge.

NOTE

The print head's heater board uses semiconductor technology with the heater and circuitry built on a silicon plate.

This silicon plate, which contains various electrical circuitry, is attached to an aluminum base. The plastic cover, which is shaped to fit the nozzles, is also attached.

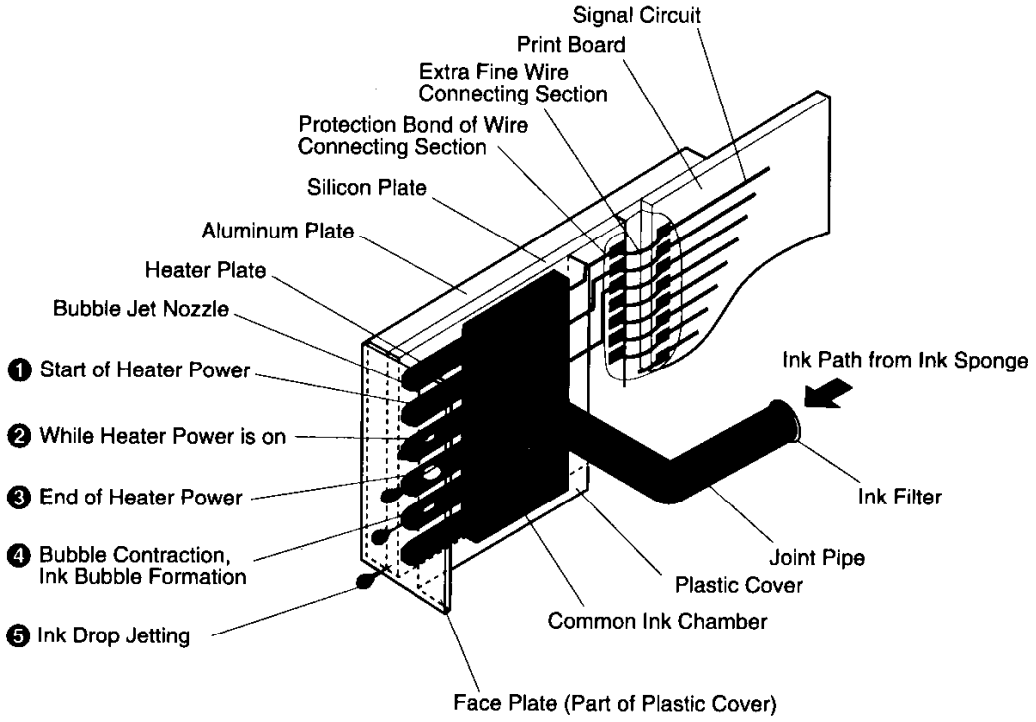


Figure 4-13 Bubble Jet Nozzles (Partial View)

2) Nozzle arrangement

The bubble jet nozzles are arranged 1/360 inch apart in a vertical array. The black BJ cartridge has 64 nozzles. On the color BJ cartridge, the first 16 nozzles are for yellow, the next 8 nozzles are unused, the second set of 16 nozzles are for magenta, then a space of 8 nozzles, and the third set of 16 nozzles are for cyan.

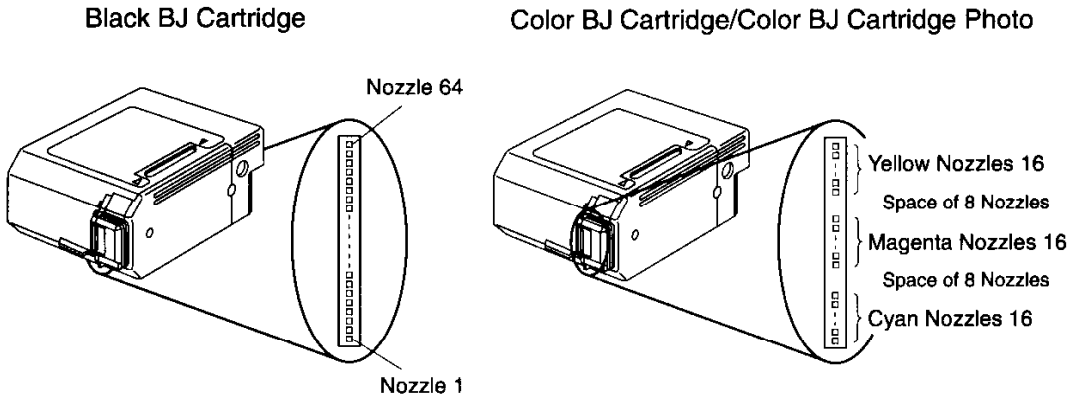


Figure 4-14 Nozzle Arrangement

3) Signal connection point (contact pad)

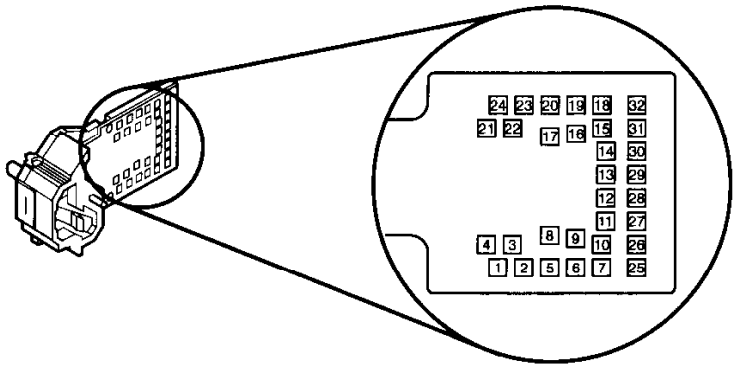


Figure 4-15 Contact Pad

TABLE 4-2 LIST OF BLACK BJ CARTRIDGE SIGNAL CONTACTS

Pin No.	Signal name	IN/OUT	Description
1	HGND1	OUT	GND for Warm-up heater's voltage VH
2	HEATER1	IN	Warm-up heater's voltage VH and Detection signal
3	TMPSEN1A	IN	Temperature sensor 1, Anode (Not Used)
4	TMPSEN1C	OUT	Temperature sensor 1, Cathode (Not Used)
5~8	SEG1~4	IN	SEG1~4 heat enable
9~16	COM1~8	IN	COM1~8 heat enable
17~20	SEG8~5	IN	SEG8~5 heat enable
21	TMPSEN2C	OUT	Temperature sensor 2, Cathode (Not Used)
22	TMPSEN2A	IN	Temperature sensor 2, Anode (Not Used)
23	HEATER2	IN	Warm-up heater's voltage VH and Detection signal
24	HGND2	OUT	GND for Warm-up heater's voltage VH
25	GND	GND	
26~27	Not used	...	
28	ID1	OUT	BJ cartridge recognition signal 1 (See the table below.)

TABLE 4-3 LIST OF COLOR BJ CARTRIDGE SIGNAL CONTACTS

Pin No.	Signal name	IN/OUT	Description
1	HGND1	OUT	GND for Warm-up heater's voltage VH
2	Not used	...	
3	HEATER1	IN	Warm-up heater's voltage VH and Detection signal
4	Not used	...	
5~8	SEG1~4	IN	SEG1~4 heat enable
9~10	COM1~2	IN	COM1~2 heat enable (Cyan)
11	Not used	...	
12~13	COM4~5	IN	COM4~5 heat enable (Magenta)
14	Not used	...	
15~16	COM7~8	IN	COM7~8 heat enable (Yellow)
17~20	SEG8~5	IN	SEG8~5 heat enable
21	Not used	...	
22	HEATER2	IN	Warm-up heater's voltage VH and Detection signal
23	Not used	...	
24	HGND2	OUT	GND for Warm-up heater's voltage VH
25	GND	GND	
26	ID2	OUT	BJ cartridge recognition signal 2 (See the table below.)
27~28	GND	GND	
29~32	HRANK		Head rank

Cartridge types BC-02, BC-05 and BC-06 photo can be distinguished with combinations of the ID1 and ID2 signals as shown in the table below.

Pin No.	Signal name	Cartridge type		
		BC-02	BC-05	BC-06 photo
26	ID2	GND	Not used	Not used
28	ID1	Not used	GND	Not used

4) Circuit diagram

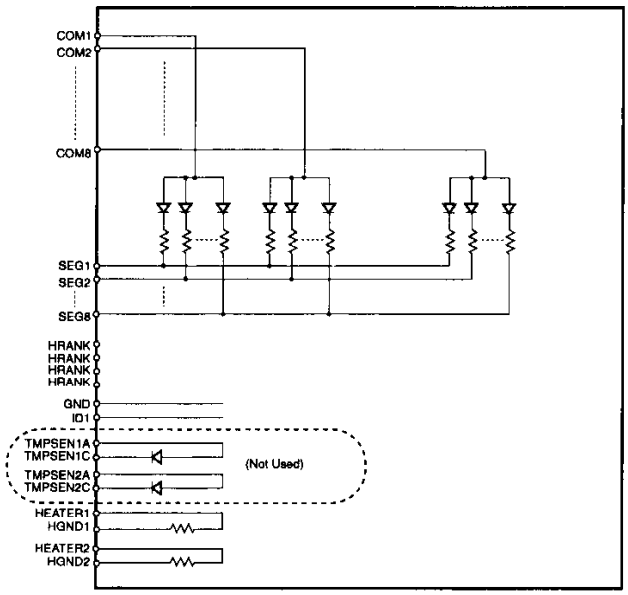


Figure 4-16 Bubble Jet Head Driver Block Diagram (Black BJ Cartridge)

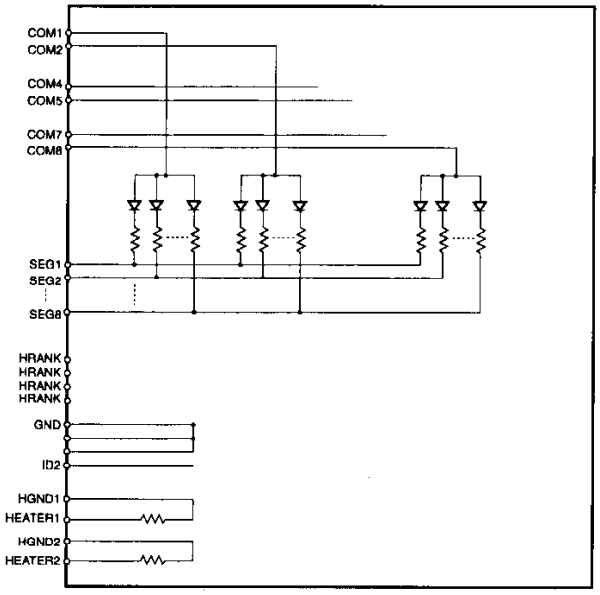


Figure 4-17 Bubble Jet Head Driver Block Diagram (Color BJ Cartridge)

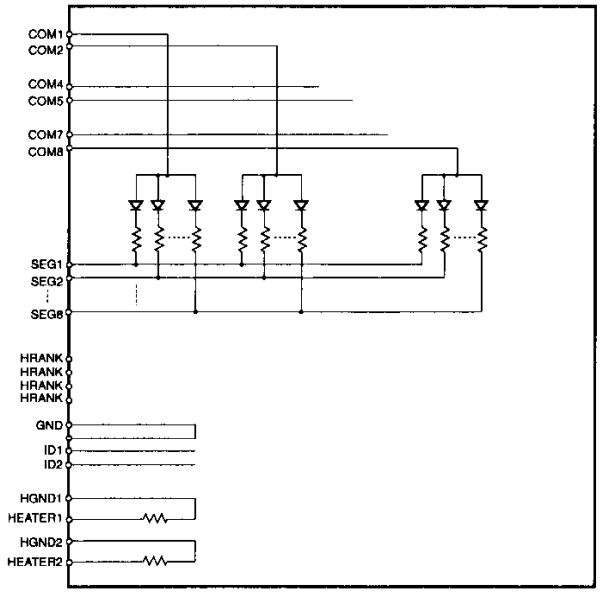


Figure 4-18 Bubble Jet Head Driver Block Diagram (Color BJ Cartridge Photo)

5) Head rank ID

One of four head rank IDs is selected to correct production variations in the bubble jet head units. The head rank ID is displayed by a PCB pattern of contact points of the bubble jet head unit. (BJ Cartridge PIN No. 29, 30, 31, 32)

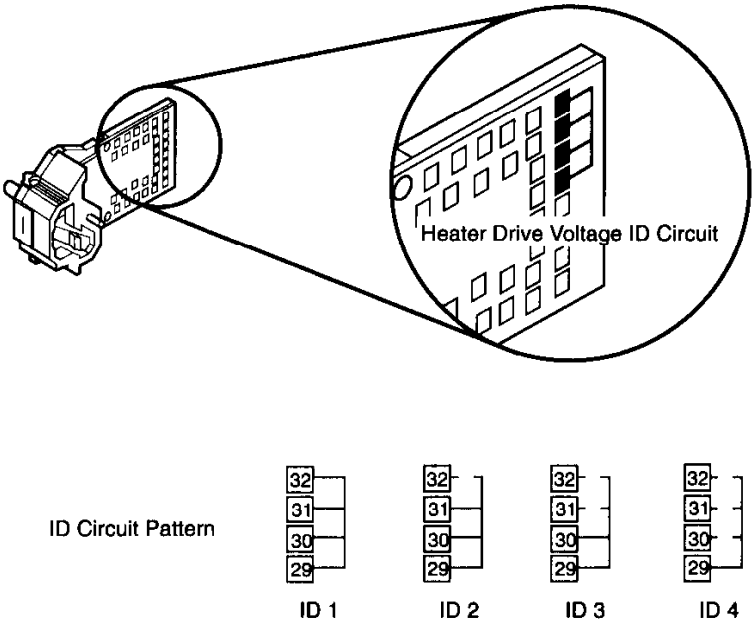


Figure 4-19 Head Rank ID

6) Temperature control

The optimum temperature of the BJ cartridge ink for high quality printing is about 23°C (73.4°F). The bubble jet head unit has warm-up heaters on the silicon plate. The black BJ cartridge, furthermore, has temperature sensors, but they are not used.

The printer controls the temperature by varying the heat pulse width (pre/main pulse width) of the SEG signal and turning the warm-up heaters on and off. The ambient temperature is detected by the temperature sensor on the printer logic board, not by the temperature sensors on the silicon plate. If it is 16°C (61°F) or less, the bubble jet head unit nozzles are warmed by the warm-up heaters.

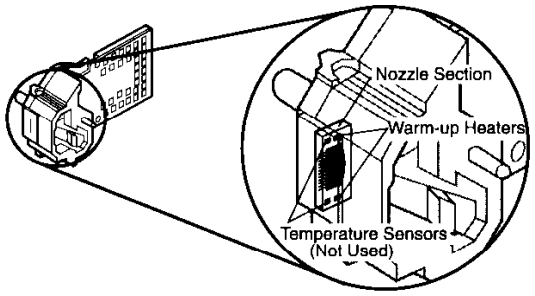


Figure 4-20 Head Temperature Controller

7) BJ cartridge detection feature

The presence or absence of the BJ cartridge is always monitored.

The contact between the terminal of the warm-up heater in the BJ cartridge and the carriage is checked. If the BJ cartridge is not detected for 1.6 seconds or more, the beeper sounds once and the *POWER/ERROR* indicator blinks green. When the BJ cartridge is installed and detected for 1.6 seconds or more, this condition is recovered.

8) BJ cartridge recognition feature

It is identified by pins #18and #22 on the J1 connector on the printer logic board which the cartridge is a black, color BJ cartridge or color BJ cartridge photo. Cartridge types BC-02, BC-05 and BC-06 photo can be distinguished with combinations of pins #18and #22 as shown in the table below.

Pin No.	Signal name	Cartridge type		
		BC-02	BC-05	BC-06 photo
18	ID2	Low	High	High
22	ID1	High	Low	High

9) Print density control

This printer controls the quantity of ink ejected so it prints at constant density. It does this by predicting the change in the head temperature while printing and using the predicted temperature.

The quantity of ink ejected from the nozzles is controlled to obtain the optimum print density by controlling the heat pulse width (pre/main pulse width) every 50 ms based on the following information: the ambient temperature sensed by the temperature sensor on the logic board; the number of dots printed by the printer; the head temperature predicted from the switch-on time of the warm-up heater; and the head rank ID for correcting production variations of the bubble jet head unit (the heater drive voltage is fixed at 27.6 V DC).

3.3 Purge Unit

3.3.1 Purge unit functions

1) Capping function

The purge unit's cap is pressed against the face of the print head to prevent the ink from drying out or leaking.

If print data is not received for 60 seconds or more during a printing operation, the purge unit wipes the printing head face. If print data is still not received for another 60 seconds, the purge unit caps the printing head.

Other than during a printing operation, if print data is not received after a certain period of time (varies between 5 to 20 seconds) or if the *POWER* button is pressed to turn off the printer, the purge unit caps the print head.

2) Cleaning function

The cleaning operation includes the wiping of paper and ink residue that has adhered to the printing head's face plate. It also sucks out ink from the printing head to replenish the inside of the nozzles with fresh ink.

The amount of ink consumed by the cleaning operation is as follows.

Black BJ Cartridge installed : 0.11 g
Color BJ Cartridge or Color BJ Cartridge Photo installed : 0.21 g

To maintain high printing quality, the purge unit cleans the printing head at the following times:

- When the power is turned on for the first time after the AC power cord is connected.
- After the BJ cartridge is replaced.
- When the power is turned on and it has been 72 hours since the last time the head was cleaned.
- Before the printing operation is performed and it has been 72 hours since the last time the head was cleaned.
- When the black or color BJ cartridge is installed and the printed dot count exceeds the set value.
- When the *RESUME* button is pressed down for 2 seconds or more.

3.3.2 Purge unit structure

1) Purge drive gear

The purge drive gear which is driven by the transmission gear activates the cam controlling the pumping operation. The transmission gear is rotated by the paper feed roller which is driven by the paper feed motor.
The cam's position is detected by the home position sensor via the sensor arm.

2) Wiper unit

When the carriage moves from left to right, the wiper retracts so that it does not touch the head. However, when the carriage moves from right to left, the wiper wipes off the ink from the BJ cartridge's face plate at the following times:
When the printer is turned on and off, once every 60 seconds (or after a set dot count is reached) during printing, when the paper feed operation ends, when the recovery operation ends, and when the cap is opened or closed.

3) Cap unit

The cap unit has a rubber cap. When the carriage moves to the home position, the cap unit is pressed against the print head's face plate to cap it.
Also, since the cap is connected to a pump, the cap sucks ink out of the BJ cartridge during the cleaning operation. The ink which has been sucked out is sent to the base cover unit's waste ink absorber.

4) Maintenance jet absorber

The maintenance jet absorber at the home position absorbs the ink ejected from the nozzles for a test to adjust the nozzles in the following cases: when the power is switched on; during printing (every 12 or 13 seconds during reverse printing); when wiping occurs during printing; when paper feeding ends; when the recovery operation ends and when the cap opens and closes.

5) Slide lock pin

The slide lock pin moves the cap when the carriage moves from left to right and reaches the capping position. Capping is thereby executed and the slide arm is unlocked. When the slide arm is unlocked, the feed roller's rotation is transmitted to the purge drive gear and sheet feeder.

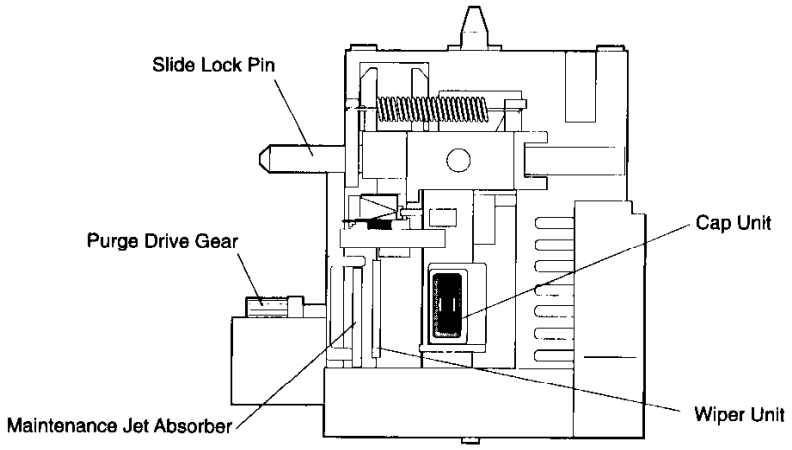


Figure 4-21 Purge Unit

3.4 Carriage

3.4.1 Carriage functions

1) Print head installation

The carriage holds the BJ cartridge mechanically with the carriadge ribbon cable, and is connected to the circuit on the logic board.

2) Carriage driver

Driven by the carriage motor and carriage belt, the carriage moves across the paper horizontally.

3) Paper thickness adjustment

With the paper thickness lever at the top of the carriage, the gap between the paper and printing head can be adjusted.

4) Paper feed motor driver

When the carriage moves to the cleaning position at the right end, the slide arm is unlocked. The paper feed motor of drive power, normally used for paper feeding during printing, can be diverted to drive the purge unit and sheet feeder.

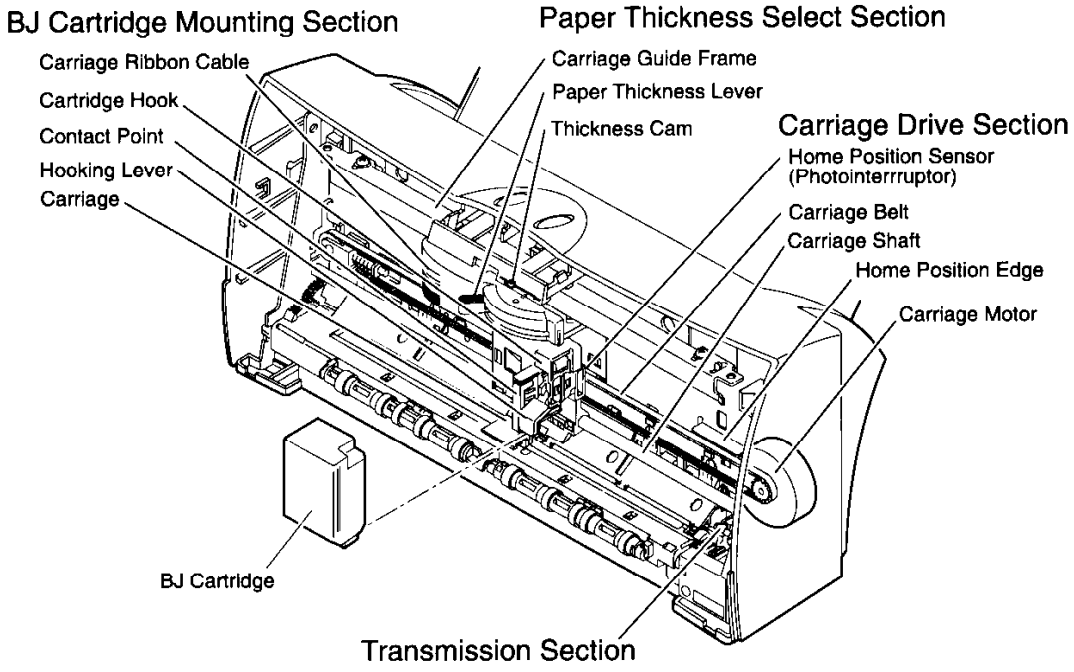


Figure 4-22 Carriage

3.4.2 Carriage structure

1) BJ cartridge mounting section

The cartridge holder moves with the locking lever which secures the BJ cartridge onto the carriage.

When a BJ cartridge is secured onto the carriage, the ribbon cable's signal contacts are pressed against the bubble jet head's signal contacts, enabling signals to be transmitted from the logic board.

2) Carriage driver

The stepping-type carriage motor drives the carriage horizontally across the paper by the carriage belt. After the photo interrupter type home position sensor behind the carriage detects the home position edge as the initial position, the carriage is controlled by the stepping pulse sent to the carriage motor.

The carriage motor is driven by a one to two-phase exciter at a fixed current.

Also, if a vertically-oriented line, etc., is printed from both carriage directions, it will appear to be crooked or misaligned due to mechanical reasons. However, if the vertically-oriented line is disjointed or not continuous, any misalignment will not be that noticeable and printing is executed from both carriage directions. The slightly-off timing of the detected home position edge is automatically corrected with the software.

3) Paper thickness setting

when envelope or thick paper is fed for printing, they will rub against the head face which may cause damage. This may also dirty the paper. This can be prevented by setting the proper paper thickness.

The gap between the head and paper must be set to the optimum setting (one of two settings) to match the thickness of paper being fed. This gap is adjusted by changing the angle of the carriage guide frame and the carriage attachment angle. The gap between the platen and head thereby changes.

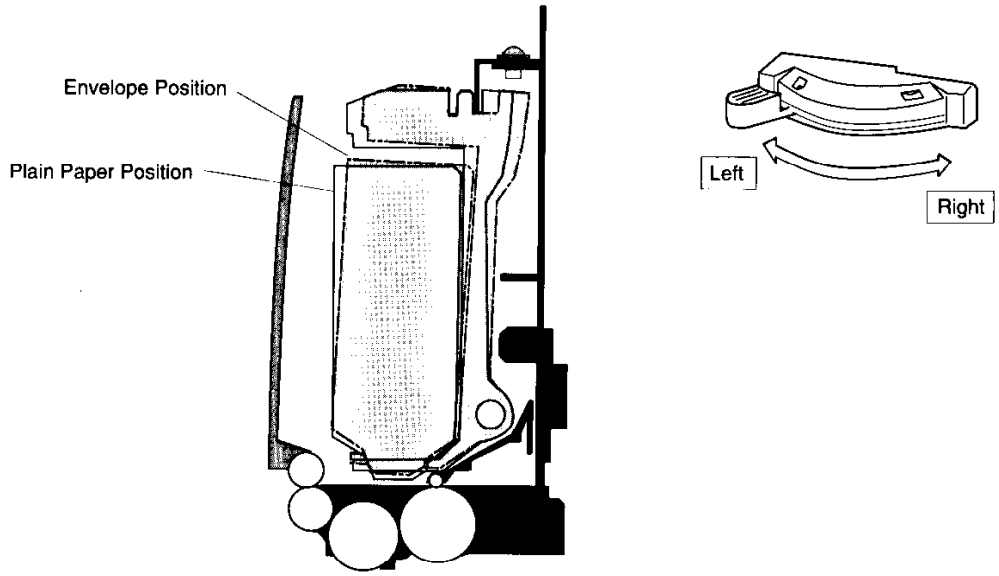


Figure 4-23 Paper Thickness Adjustment

4) Switching the paper feed motor drive transmission

When the carriage is not at the right end, the slide arm is locked by the purge unit's slide lock pin. In this condition, the paper feed is driven by the feed roller. When the carriage is at the capping position, the slide arm is unlocked and the paper feed motor drives the purge unit and sheet feeder.

When the slide arm is unlocked and the feed roller rotates in the feeding direction, the slide arm rotates until it reaches the cut sheet feeder gear and drives the cut sheet feeder gear.

With the slide arm unlocked and the feed roller rotating in an opposite direction to the feeding direction, the slide arm rotates until it reaches the purge drive gear and drives the purge drive gear.

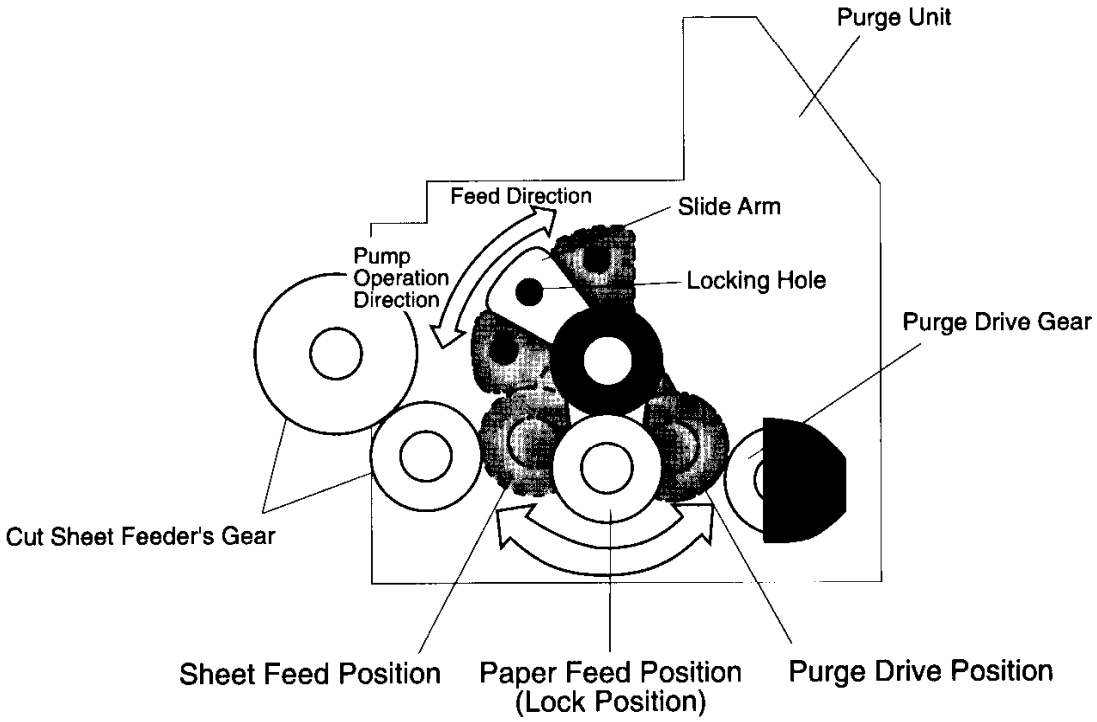


Figure 4-24 Paper Feed Motor Drive Transmission

3.5 Paper Feed

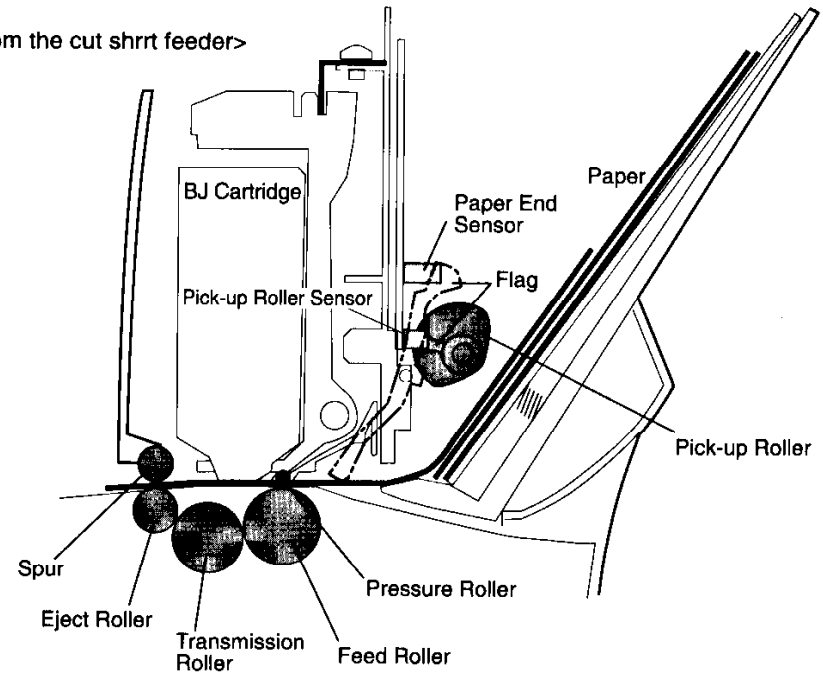
3.5.1 Outline of the paper feed

1) Paper feed mechanism

The paper feed mechanism can supply paper in two ways, automatically from the cut sheet feeder and manually from the manual feeding slot.

The built-in cut sheet feeder is driven by the paper feed motor. Paper stacked in the sheet feeder is picked up and fed automatically. Even thick paper like envelopes can

<Paper path from the cut shrrt feeder>



<Paper path from the manual feeding slot>

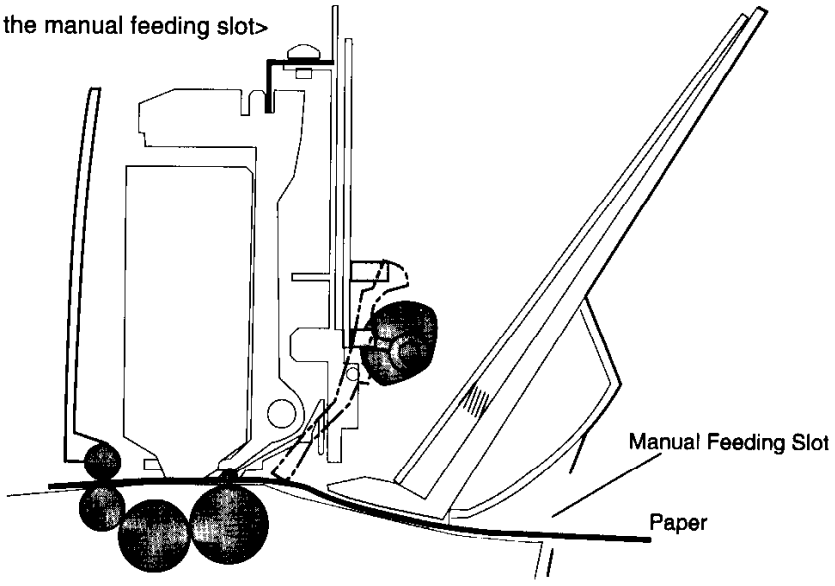


Figure 4-25 Paper Feed Mechanism

be fed automatically without selecting the paper type mechanically with the paper selection lever.
When paper is loaded in both the cut sheet feeder and manual feeding slot, priority is given to the manual feeding slot.
When the paper is sensed by the paper end sensor, it is fed automatically by the paper feed roller until it reaches the starting position for printing on the platen.
During printing, the paper is fed by the rotation speed of the paper feed roller.
The paper after printing is delivered out by the eject roller.

2) Paper feed operation
Paper feed operations is executed by the *RESUME* button. When the *RESUME* button is pressed until the beeper sounds once, the paper is fed automatically from the sheet feeder if it is not at the starting position. If the paper is already at the starting position, it is delivered out.

3.5.2 Auto feed / Manual feed

This printer has no paper selection lever on the cut sheet feeder.
If the paper meets specification, it can be fed without selecting operation the paper type.

The paper is loaded in the cut sheet feeder such that a corner of it is caught by the paper separator.
When printing starts, the pick-up roller starts to rotate through the drive of the paper feed motor.
Plain paper is fed with its corner held by the paper separator, and then pushed into the paper feed section.
When printing on thick paper like envelopes, as the paper is stiffer than the return force of the paper separator's spring, the paper separator is pressed down to feed the paper. (See Figure 4-26.)

Initial position of the pick-up roller is detected when the flag is sensed by the pick-up roller sensor on the logic board.
When the paper is sensed by the paper end sensor for over a second, it is fed automatically until it reaches the starting position for printing.
If the paper is not sensed even when the paper pick-up operation is executed, it is executed again. If the paper is still not sensed, it is assessed as a paper feed error occurs.

When manual feeding, the user sets the paper in the manual feeding slot until it reaches the position where the paper end sensor detectes the paper.
Paper pushed into the paper feed section is fed to the starting position for printing after it has been sensed by the paper sensor for over a second.
At this time, the paper passes through a different paper path from that of the cut sheet feeder. This makes it possible to give priority to manually fed paper, even when paper is loaded in the cut sheet feeder.

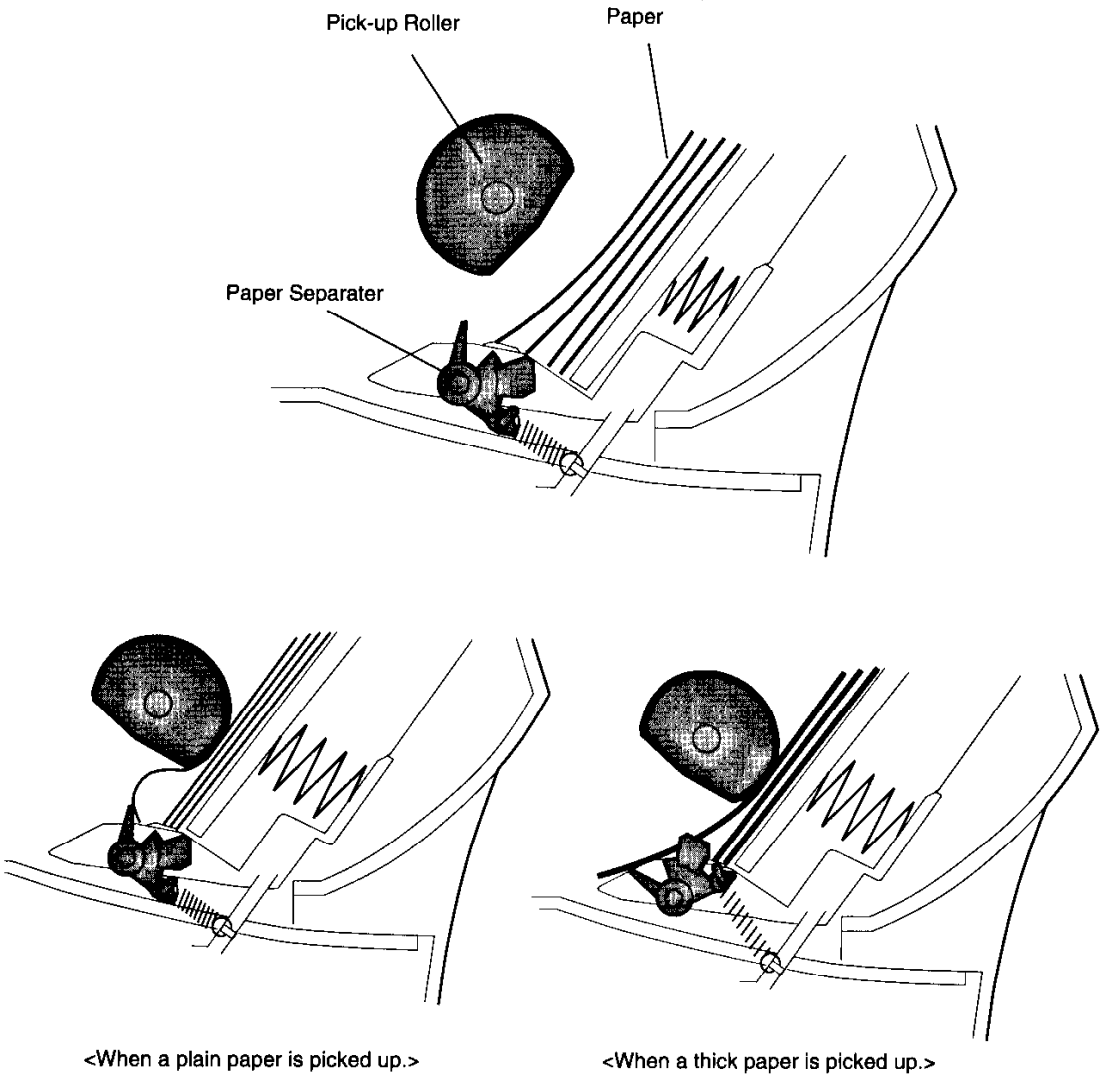


Figure 4-26 Paper Separater

4. PRINTER ELECTRICAL SYSTEM

4.1 Overview

The electrical system's functions are handled by the logic section and power supply. The logic section converts the data from the interface into print signals or printer operation signals and drives the BJ cartridge and all the motors while monitoring the status of each sensor.

The power supply converts the DC input power from the AC adapter into driving power for the logic board, motors, bubble jet head, etc.

When DC input power from the AC adapter is being supplied, all of the hardware components are active except for the following: the *RESUME* button, the photo interrupter type sensor, and the interface's I/O signals.

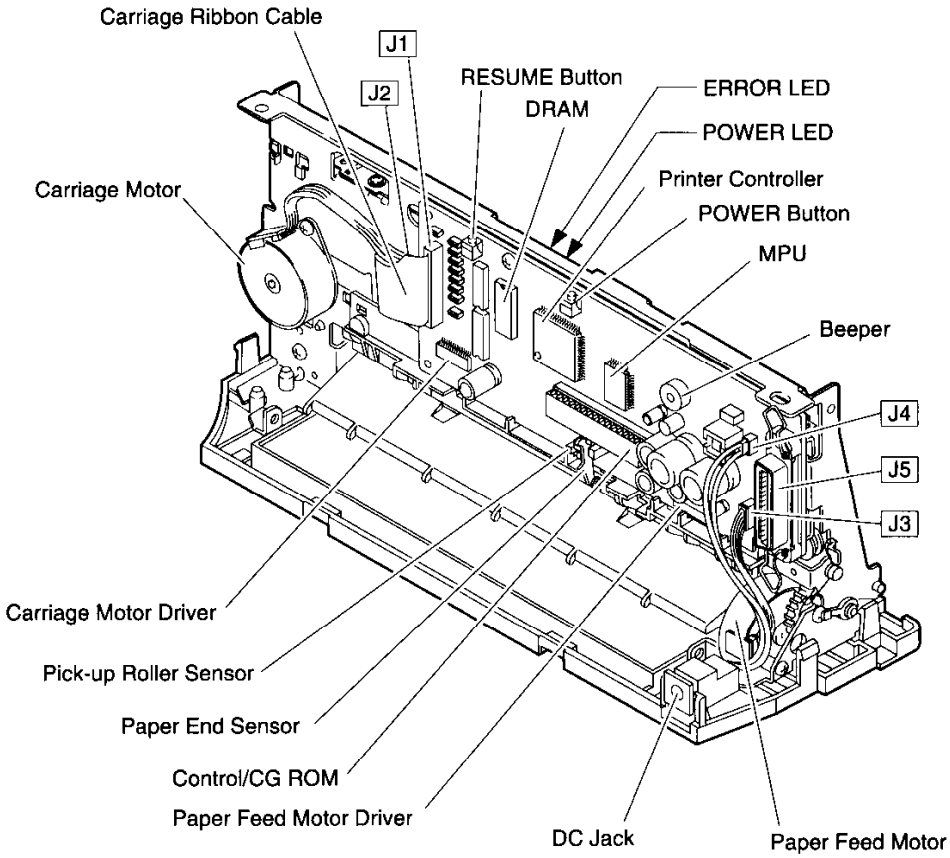


Figure 4-27 Printer Electrical System

4.2.2 Logic section components

1) MPU (IC1)

The MPU contains a 16-bit CPU, 1K-bit RAM, 24-bit address bus port, 16-bit data bus port, stepping motor controller, interrupt controller, A-D converter, I/O port, and other components.

Built-in CPU

The 16-bit CPU generates the 8 MHz clock from the 16 MHz external clock input and is synchronized with the clock.

Address bus

The 24-bit address bus port is connected to an 8 M-bit control/CG ROM and printer controller. The control/CG ROM synchronizes with the read signals output by the MPU and the 8 MHz clock signal. The printer controller then selects the chip.

Data bus

Like the address bus, the 16-bit data bus port is connected to the 8 M-bit control/CG ROM and printer controller.

Stepping motor controller

The stepping motor controller outputs the carriage motor's single- and two-phase exciter drive signal and paper feed motor's two-phase drive signal.
The stepping motor controller switches the carriage motor with the 5-step peak current value for optimum driving. The stepping motor controller outputs the switching control signal to the carriage motor driver.

Interrupt controller

For external interruption, the MPU has ports P80, 81, 84, 85, and 87 to receive the POWER button's on/off switching, data reception, initial interrupt request, receive buffer-full warning, and other signals. The MPU executes interrupt processing for the respective signals.

A-D converter

The following analog signals are digitally converted to enable them to be detected by the MPU:

AN0: The printer's internal temperature is detected by the thermistor on the logic board.
AN1: It detectes whether the BJ cartridge is installed in the printer, or not.
AN2: It monitors the VH voltage which drives the head of the cartridge.
AN3: The head rank is detected by the rank resistor in the BJ cartridge.

I/O port

The head ID, paper end sensor, home position sensor, and pick-up roller sensor are input to the port. The buzzer, BJ cartridge detection, head-driving voltage control, and other signals are output from the port.

2) Printer controller (IC5)

The printer controller contains the interface controller, print head controller, buffer controller, DRAM controller, EEPROM controller, I/O port, etc. It operates in synchronization with an 22.11 MHz external clock input.

Interface controller

The interface controller receives from the computer, 8-bit parallel data which is synchronized with the data strobe pulse (STROBE) through the BUSY/$\overline{\text{ACKNLG}}$ handshake. It also controls other interface signals.

The data received from the interface is stored in the DRAM's receive buffer and analyzed by the MPU.

When the printer initialize signal ($\overline{\text{INIT}}$) from the parallel interface is input to the printer controller, the printer controller outputs the BUSY signal. Also, after the INT1 signal is output to the MPU and the print data in the printing buffer is printed, the printer is initialized.

DRAM controller

The DRAM controller is a DRAM-exclusive bus separate from the MPU's bus. It controls the 1 M bit DRAM's 8-bit addressbus and 16-bit data bus and also executes read/write control, RAS/CAS control, and refresh control.

Buffer controller

The buffer controller automatically writes the received data into the receive buffer on the DRAM, manages the receive buffer's remaining capacity, automatically reads the print buffer, and clears the data after it is read.

Print head controller

The print head controller counts the number of dots of the bit map print data read from the DRAM print buffer to control the heat pulse width (pre/main pulse width), converts it to the COM and SEG signals for 8 x 8 matrix printing control, and controls heating of the heater plate of the bubble jet nozzles of the BJ cartridge.

I/O port

The I/O port senses the *RESUME* button input status. The output port controls the lighting of the *POWER/ERROR* indicator.

3) Control/CG ROM (IC3)

The 8 M-bit control/CG ROM contains the program for printer control and bitmap font data.

4) DRAM (IC4)

Controlled by the printer controller, the 1 M-bit DRAM is used as the receive buffer, download buffer, print buffer, and working area.

5) Reset IC (IC7)

This detects the power voltage when turning the power on or off.

6) EEPROM (IC8)

Controlled by the printer controller, the 1 K-bit EEPROM (Electrically Erasable and Programmable ROM) stores various function settings, the total count of printed sheets, and the total waste ink amount.

7) Paper feed motor driver IC (IC6)

Controlled by the MPU, the paper feed motor driver drives the paper feed motor (controlled by the two-phase exciter) with a constant-voltage unipolar drive. The driver IC has four same circuits.

8) Carriage motor driver IC (IC12)

Controlled by the MPU, the carriage motor driver drives the carriage motor (controlled by the one to two-phase exciter) with a fixed current bipolar drive. In accordance with the switching signal from the MPU, the peak current value is set to five steps and driven.

The driver IC has two same circuits.

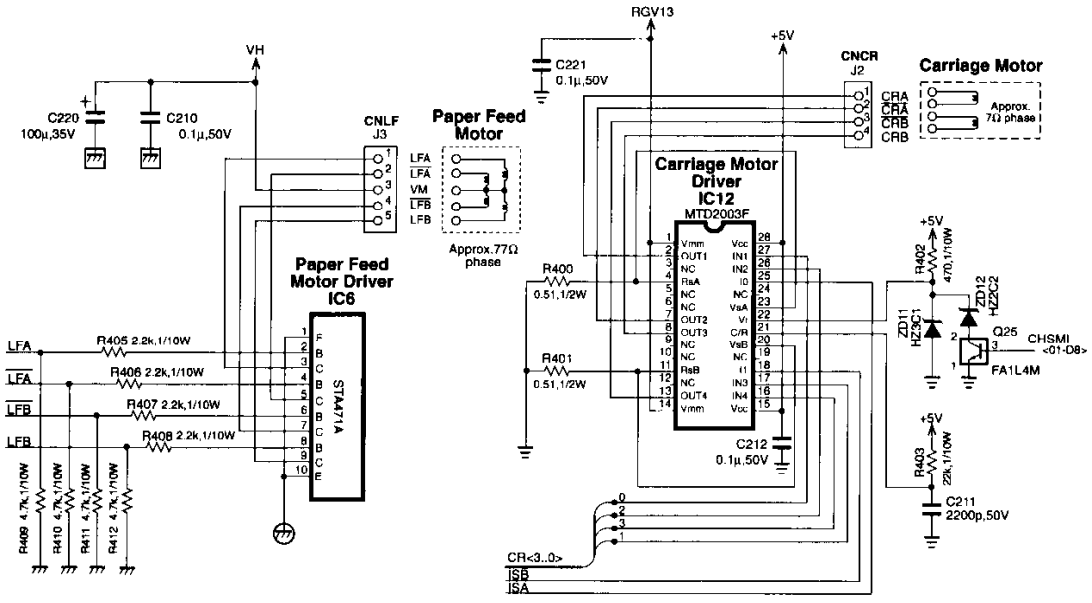


Figure 4-30 Motor-driving Circuit

4.3 Power Supply

4.3.1 Power supply block diagram

The power supply comprises of the dropper-type AC adapter which converts the AC input into +13 VDC and the switching power supply (DC-DC converter) which outputs Vcc (+5 VDC) and VH (+27.6 VDC) from +13 VDC.

4.3.2 Power supply components

1) AC adapter

The AC adapter is a dropper-type power supply unit consisting of a transformer, rectifier/smoothing circuit, and protection circuit (fuse). The rated output is +13 VDC 1A.

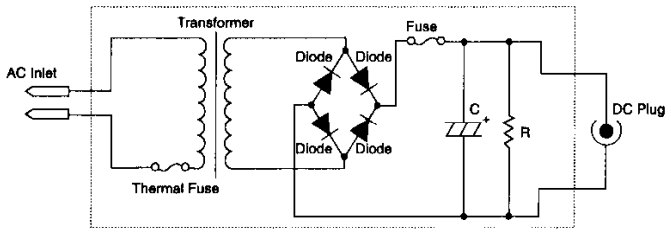


Figure 4-31 AC Adapter

2) Switching power supply

Vcc output

The DC input from the AC adapter is smoothed by the noise filter smoothing circuit. Then it steps down choke coil L2's output voltage with the switching regulator (IC25). The stepped-down output voltage is smoothed and then output as the IC and LSI's driving voltage Vcc (+5 VDC).

Choke coil L2's output voltage is fed back for voltage control.

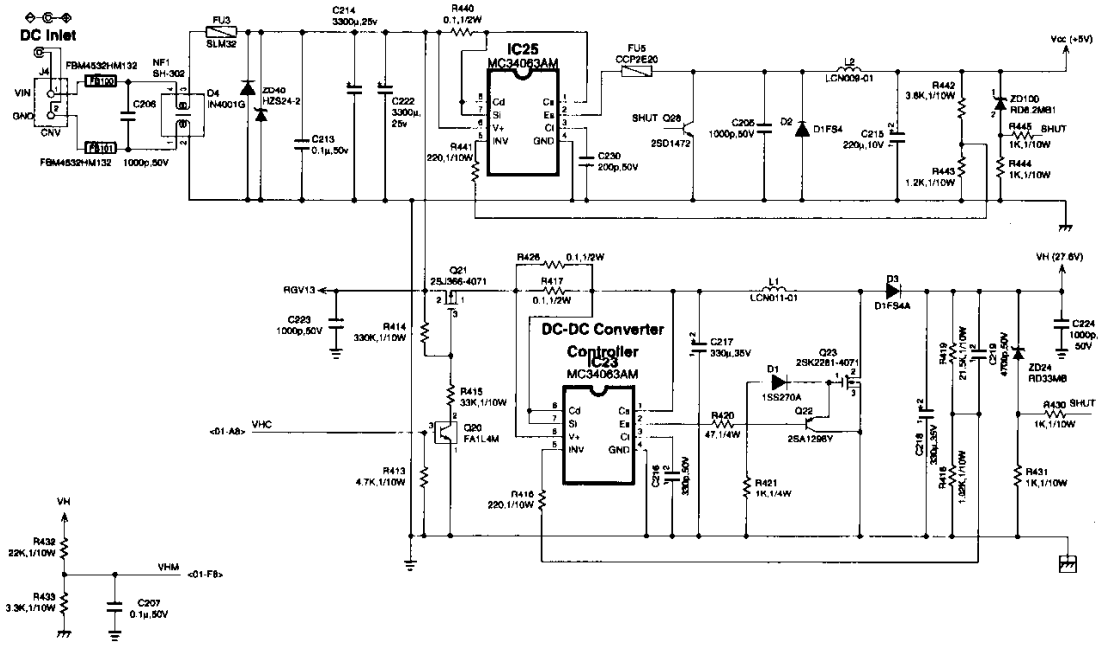


Figure 4-32 Power Supply

VH output

The smoothed output voltage steps up choke coil L1's output with switching transistor Q23 which is controlled by the DC-DC converter controller (IC23). The stepped-up output voltage is smoothed and then output as the head and motor's driving voltage VH (+27.6 VDC).

The voltage divided by resistors R418 and R419 is controlled while being fed back.

The abnormal voltage output is detected by the Zener diode (ZD24). By turning on transistor Q28, Vcc(+5 VDC) is stopped.

5. SENSOR FUNCTIONS

The printer has a pick-up roller sensor, paper end sensor, home position sensor (purge sensor), printer temperature sensor, and head temperature sensor.
Also, the EEPROM counts and records the waste ink absorption amount. When the waste ink absorber becomes full, the waste ink absorption amount indicates an error.

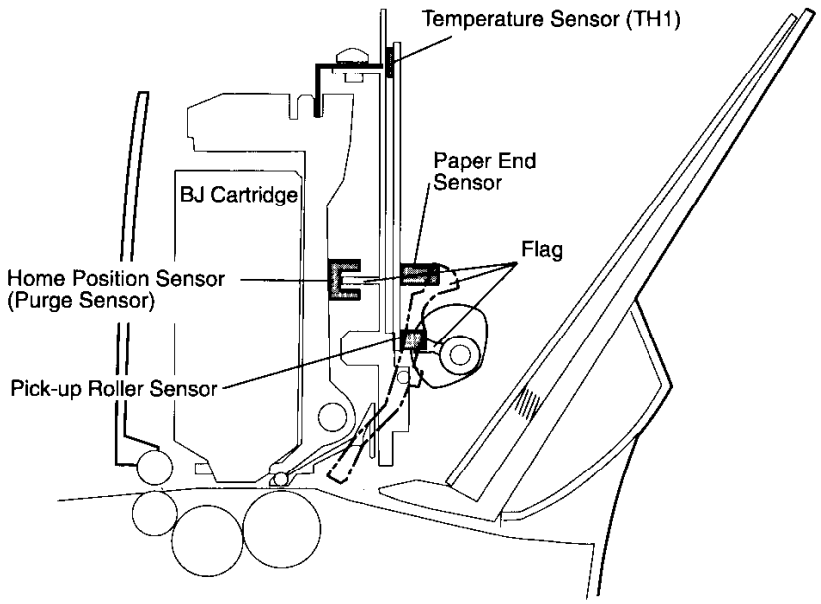


Figure 4-33 Sensors

5.1 Pick-up Roller Sensor

The photo interrupter-type pick-up roller sensor detects the initial position of the sheet feeder's pick-up roller. When the initial position is detected, the flag interrupts the sensor.

5.2 Paper End Sensor

The photo interrupter-type paper end sensor detects with the paper sensor arm's flag when a sheet of paper passes through the paper feeding mechanism. When the flag interrupts the sensor, the sensor does not detect the paper. When the flag does not interrupt the sensor, the sensor detects the paper.

5.3 Home Position Sensor (Purge Sensor)

The photo interrupter-type home position sensor senses the home position edge and detects the carriage position. After the edge is detected, the carriage moves to the right. At the home position, the maintenance jet is executed.
Also, at the capping position, the on/off of the home position sensor (purge sensor) flag during the recovery operation is detected.

5.4 Temperature Sensor

The temperature sensor is a thermistor which detects the printer's internal temperature. The thermistor's resistance changes along with any temperature changes. The change in the resistance is detected as a change in the voltage by the MPU. The analog value input to the MPU is converted into a digital value by the

internal A-D converter. The temperature is thereby detected. After the printer temperature is detected, the head-driving and head temperature adjustment signal are controlled accordingly.

5.5 Waste Ink Amount Detection

Waste ink is discharged for head maintenance and absorbed by the waste ink absorber. If the amount of waste ink discharged exceeds the absorption capacity of the waste ink absorber, ink might leak from the printer.

To prevent ink from leaking, the waste ink absorber capacity is estimated and detected when full.

The waste ink is discharged during maintenance jet and recovery. The amount of waste ink discharged is estimated by counting the number of maintenance jet and recovery. Then the waste ink amount with evaporated ink is calculated. When the calculated waste ink amount exceeds the capacity of the waste ink absorber, a waste ink-full error occurs.

TABLE 4-4 LIST OF SENSOR FUNCTIONS

Sensor Function	Description	Status
Paper detection	Detected by the paper sensor	Provided
Home position detection	Detected by the home position sensor	Provided
BJ cartridge detection	Detected by the HEATER signal of BJ cartridge	Provided
BJ cartridge identification	Identified by combination of the ID2 and ID1 signals (pins #18 and #22 of connector J1 on the control board).*	Provided
Waste ink amount detection	Calculated with the maintenance jet dot count	Provided
Paper width detection		Not provided
Ink detection		Not provided

Cartridge types BC-02, BC-05 and BC-06 photo can be distinguished with combinations of the ID1 and ID2 signals as shown in the table below.

Pin No.	Signal name	Cartridge type		
		BC-02	BC-05	BC-06 photo
18	ID2	Low	High	High
22	ID1	High	Low	High

1. MAINTENANCE

1.1 Periodic Replacement Parts

Level	Periodic replacement part
User	None
Service personnel	None

1.2 Consumables

Level	Consumable
User	Black BJ cartridge BC-02
	Color BJ cartridge BC-05
	Color BJ cartridge BC-06 Photo
Service personnel	None

1.3 Periodic Maintenance

Level	Periodic maintenance
User	None
Service personnel	None

2. SERVICE TOOLS

2.1 List of Tools

Standard Tool	Use
Phillips screwdriver	For removing screws
Blade screwdriver	For removing plastic parts
Tweezers	For installing coil springs
Multi-meter	For troubleshooting

Special tool (Parts No.)	Remarks
Gap gauge 0.5 mm (QY9-0001-000)	For head gap adjustment (Two gap gauges are necessary.)
BJ cartridge BC-02, BC-05 or BC-06	Have it ready as a special tool. (It is for adjusting the head gap. Do not use the user's one as the gap gauge touches the nozzles.)
Grease FLOIL G311S (TKC-0953-000)	Apply to the specified sections as shown in Figure 5-1.

3. APPLYING THE GREASE

Use the special tool to apply grease at the points shown below.

CAUTION

When Applying grease to the area that rubs between the carriage and carriage shaft, take care not to get grease on the purge unit wipes and cap unit.

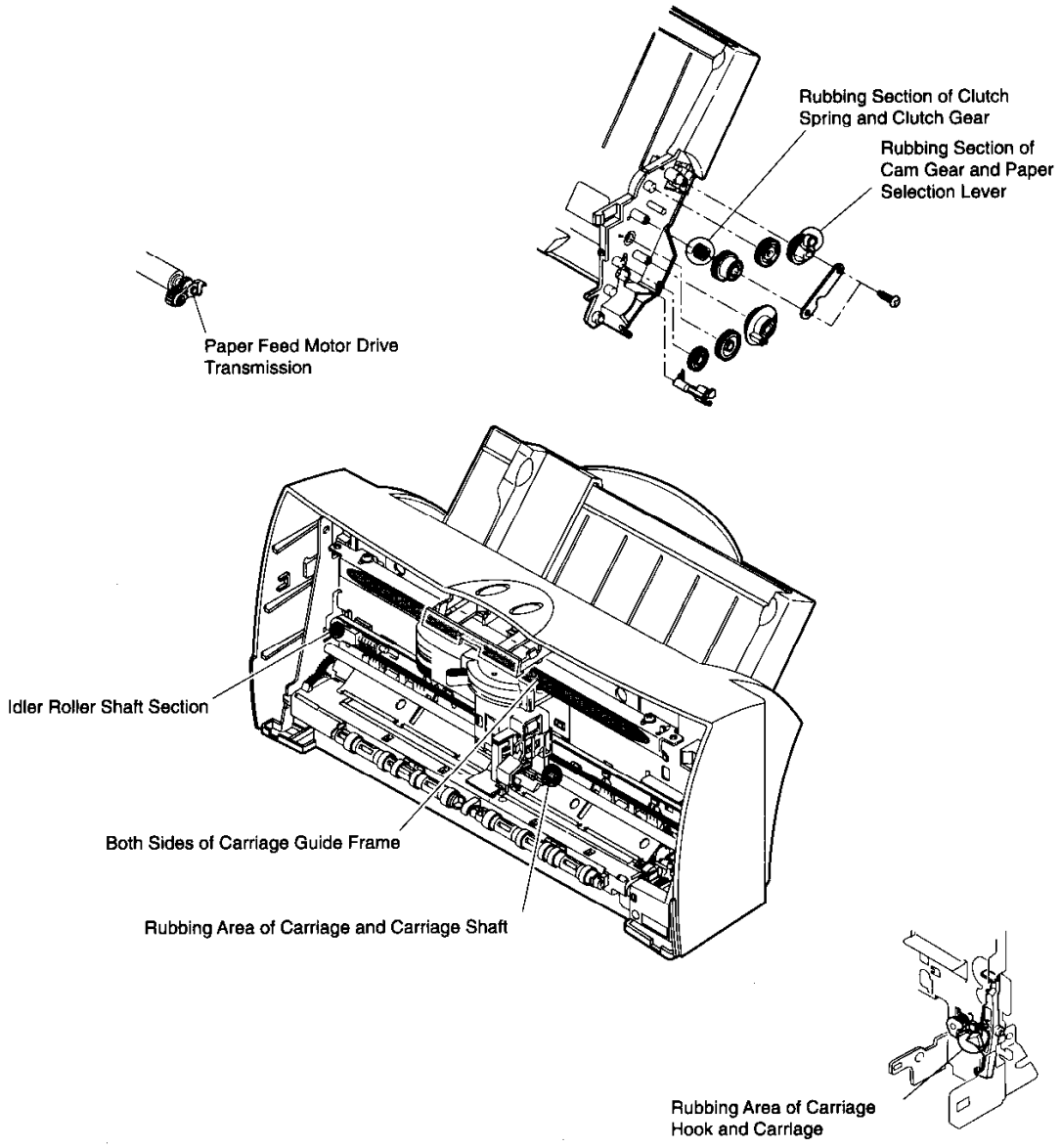

Rubbing Section of Clutch Spring and Clutch Gear
Rubbing Section of Cam Gear and Paper Selection Lever
Paper Feed Motor Drive Transmission
Idler Roller Shaft Section
Both Sides of Carriage Guide Frame
Rubbing Area of Carriage and Carriage Shaft
Rubbing Area of Carriage Hook and Carriage

Figure 5-1 Greasing Points

4. DISASSEMBLY AND REASSEMBLY

4.1 Disassembly and Reassembly

When disassembling or reassembling the printer, refer to the parts catalog. In the parts catalog, the Figure Number is in the order of the disassembly procedure. Close-up diagrams are also provided for additional detail.

4.2 Disassembly and Reassembly Cautions

When disassembling or reassembling the printer, note the following cautions. Cautions are also provided in the parts catalog.

4.2.1 Carriage guide frame installation

The carriage guide frame adjusts the head gap between the BJ cartridge's head face and platen to obtain optimum printing quality. It is mounted on the printer frame.
The head gap must be adjusted only when the carriage guide frame's position on the printer frame is altered.
The screws fastening the carriage guide frame are painted red to indicate that they are not to be loosened during servicing.
If the carriage guide frame must be disassembled, follow the procedure in *Part5: 5. ADJUSTMENT* (page 5-6) to adjust the head gap.

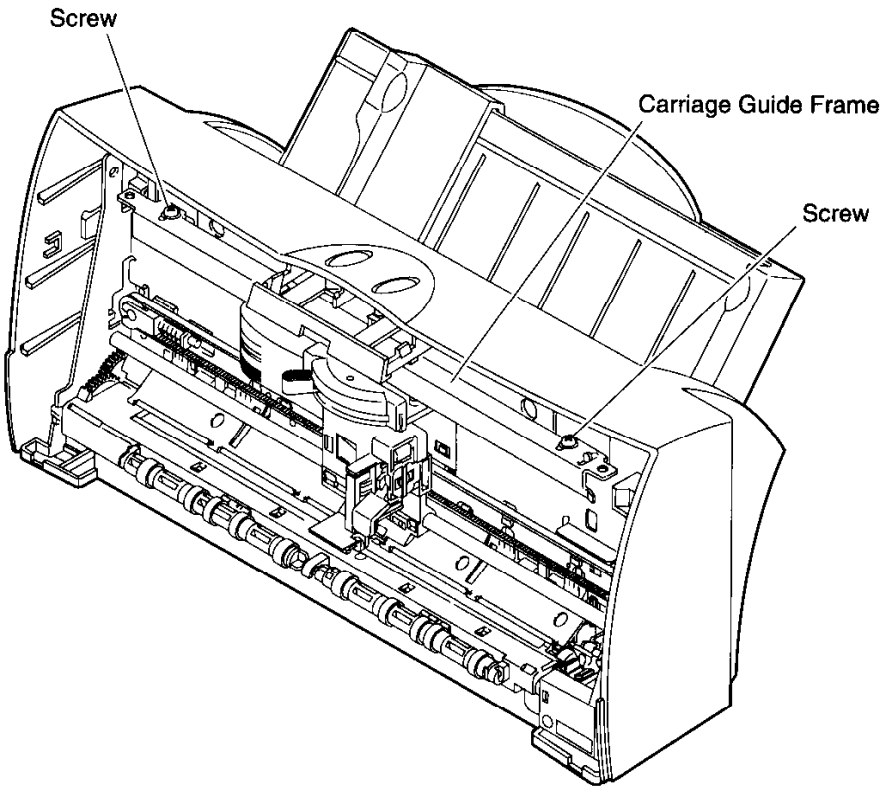


Figure 5-2 Carriage Guide Frame

4.3 Logic Board and Waste Ink Absorber Replacement Cautions

4.3.1 Logic board replacement cautions

The various settings, waste ink amount, and other data stored in EEPROM on the logic board cannot be rewritten to the new EEPROM after the logic board is replaced.

The data in the new logic board's EEPROM is undefined. After the logic board or EEPROM is replaced, reset the EEPROM as described in *Part 3: 3.6.1 Resetting the EEPROM* (page 3-22).

When replacing the logic board, make a visual check of the amount of waste ink absorption in the ink waste absorber. Replace the waste ink absorber if necessary. Depending on the amount of waste ink already absorbed, the ink may leak even before a waste ink-full error occurs.

1) When ink appears on the upper waste ink absorber, replace both upper and lower absorbers.

2) Be sure to replace the lower waste ink absorber regardless of 1). However, it is not necessary to replace it if the printer has been in use for less than 2 weeks and less than 100 pages have been printed out and if only the area on the lower absorber which are exposed from the upper absorber are covered with ink. (If necessary, confirm the number of pages printed before replacing the PCB by printing out the ASCII pattern.)

Replace the upper waste ink absorber only if it has absorbed ink. It is not necessary to replace it if waste ink is just adhering to its bottom side attached to the lower waste ink absorber.

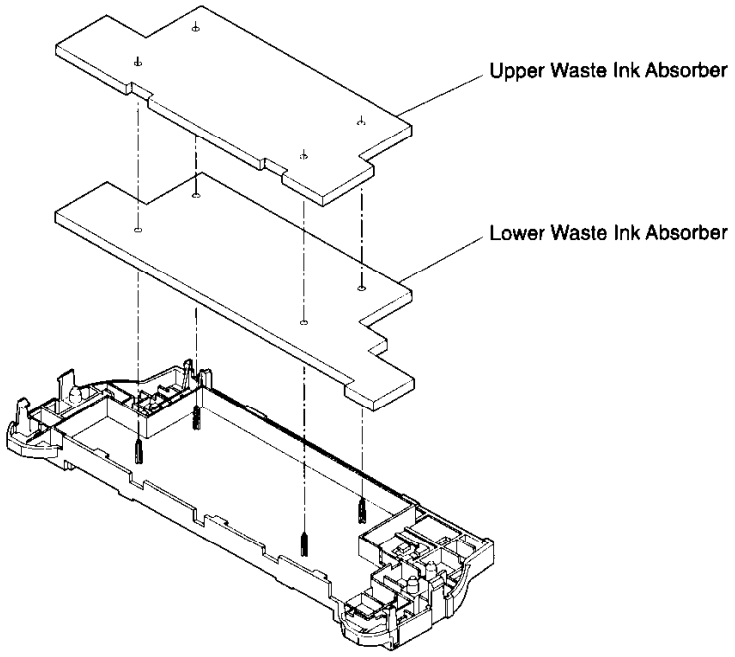


Figure 5-3 Waste Ink Absorbers

CAUTION

Once reset EEPROM data cannot be comfirmed with a test print. Be sure to confirm the data before resetting.

4.3.2 Cautions after replacing the waste ink absorber

After a waste ink-full error occurs and the waste ink absorbers are replaced, reset the EEPROM.

When a waste ink-full error occurs, it can be assumed that the printer has printed more sheets than its service life. However, this depends on how many times the cartridge is replaced and the conditions under which it was used.

When a color BJ cartridge is used, more ink is consumed due to head maintenance compared to a black BJ cartridge. Therefore, the waste ink amount will also be more.

5. ADJUSTMENTS

5.1 Adjustment Point

Only the head gap between the BJ cartridge's head face and platen needs to be adjusted (to approximately 1 mm). This is to ensure optimum printing quality.
This adjustment is done by moving the position of the carriage guide frame forward or back.

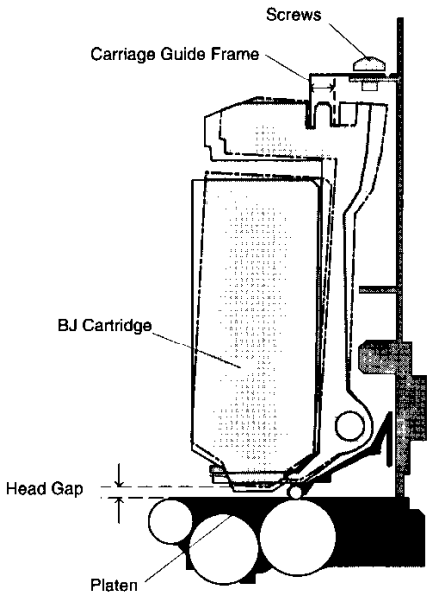


Figure 5-4 Head Gap Adjustment

NOTE The head gap differs according to the position of the paper thickness lever. To adjust the head gap, push the paper thickness lever to the left (for plain paper printing with a black BJ cartridge) and set the head gap to approximately 1 mm.

5.2 When Adjustment is Required

If the carriage guide frame fastened to the printer frame is repositioned, the head gap must be adjusted.
The screws are painted red to ensure that the screw is not loosened unnecessarily.

5.2.1 Required tools

TABLE 5-1 TOOLS REQUIRED FOR HEAD GAP ADJUSTMENT

Tool	Use
Gap gauge 0.5 mm (QY9-0001-000)	For adjusting the head gap (Two gap gauges are necessary.)
BJ cartridge BC-02, BC-05 or BC-06 photo	Use as a tool Note: Do not use the user's BJ cartridge as the cap gauge can hit the nozzle.

5.3 Adjustment Procedure

5.3.1 Preparation

1) Remove the upper case unit. (Or assemble the printer until the rear cover is attached.)
2) Install a BJ cartridge (for servicing) into the carriage.
3) Loosen screws A and B fixing the guide.
4) Push in the carriage guide frame in the direction of the arrows and tighten screws A and B lightly.
5) Move the carriage to position A (the eject roller holder in the center of the platen) by moving the belt.

CAUTION

Before making the adjustment, make sure the gap gauge is not deformed and there is no foreign matter on and around the platen.

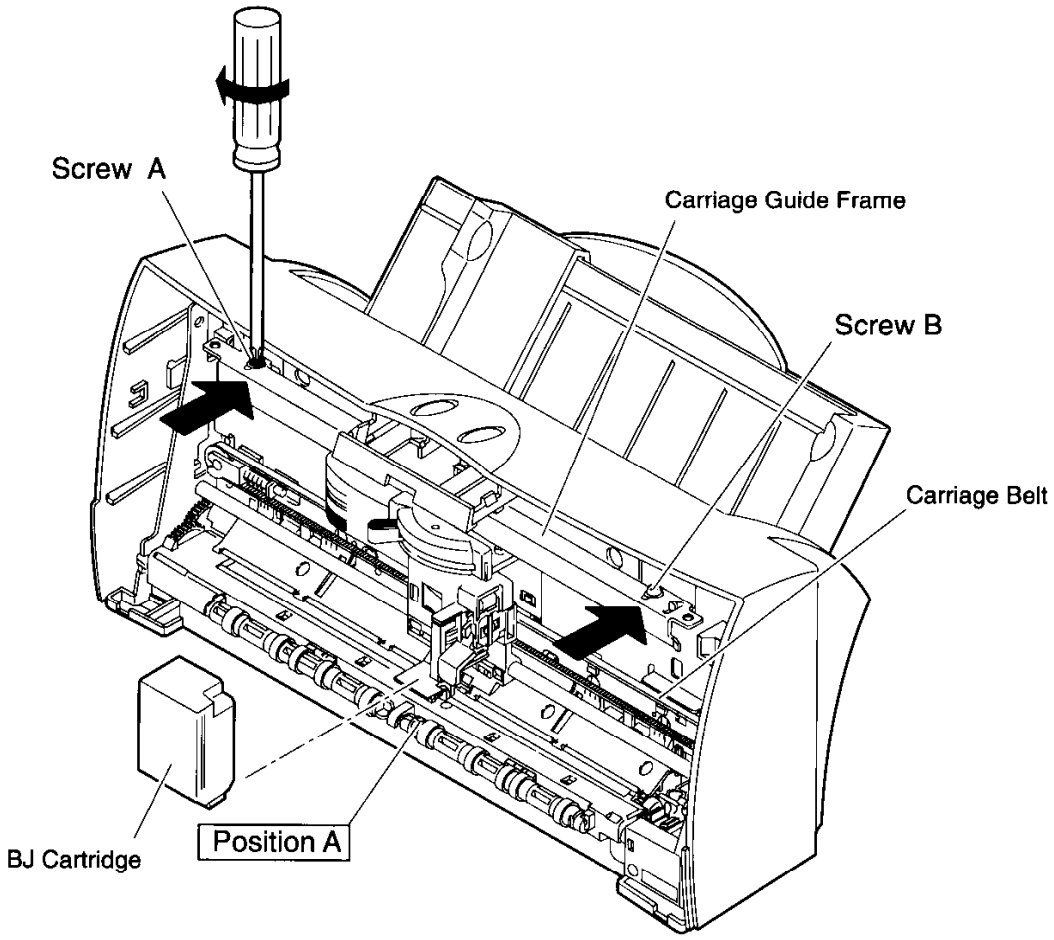


Figure 5-5 Preparations Before Adjustment

5.3.2 Adjustment

1) Set the paper thickness lever to the right and place the two gap gauges at position B.
2) Move the carriage to position B.
3) Set the paper thickness lever to the left.
4) Loosen screw A until the carriage guide frame moves forward on the axis of screw B by the carriage's own weight.
5) Lightly push the screw A end of the carriage guide frame once or twice and check that the carriage guide frame moves on the axis of screw B as shown by the arrows. (Fig. 5-7)
   If it does not return to the original position, screw B is too tight. And if it moves on the screw B end as well, screw B is too loose. Refasten the carriage guide frame lightly again and repeat the procedure from preparation 3).
6) Tighten screw A lightly.
7) Set the paper thickness lever to the right and move the carriage to position A. Then move the two gap gauges at position C.
8) Move the carriage to position C.
9) Set the paper thickness lever to the left.

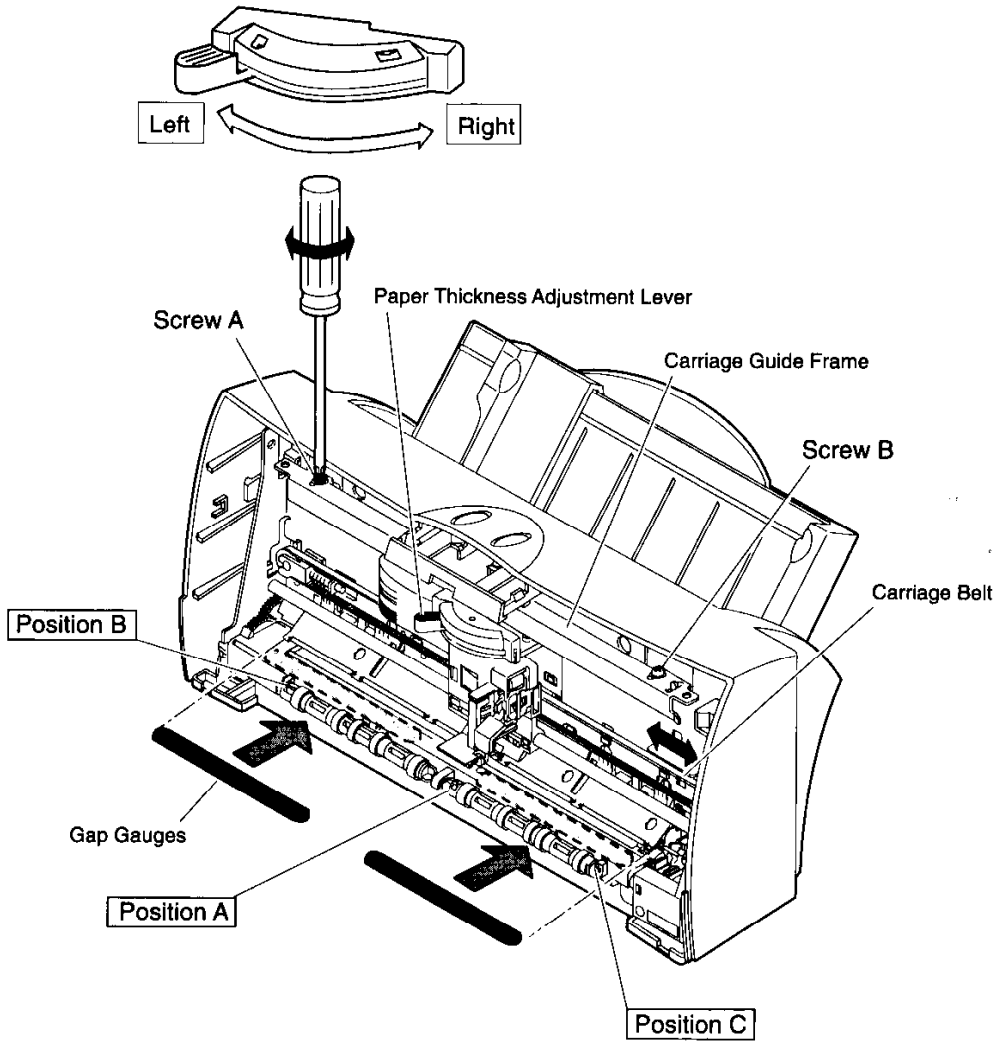


Figure 5-6 Head Gap Adjustment

10) Loosen screw B until the carriage guide frame moves forward on the axis of screw A by the carriage's own weight.
11) Lightly push the screw B end of the carriage guide frame once or twice and check that the carriage guide frame moves on the axis of screw A.
If it does not return to the original position, screw A is too tight. And if it moves on the screw A end as well, screw A is too loose. Refasten the carriage guide frame lightly again and repeat the procedure from preparation 3).
12) Tighten screw B lightly.
13) Set the paper thickness lever to the right and move the carriage to position A. Then move the gap gauge at position B.
14) Repeat steps 2) through 13) twice.
15) Tighten screws A and B alternately for final tightening.

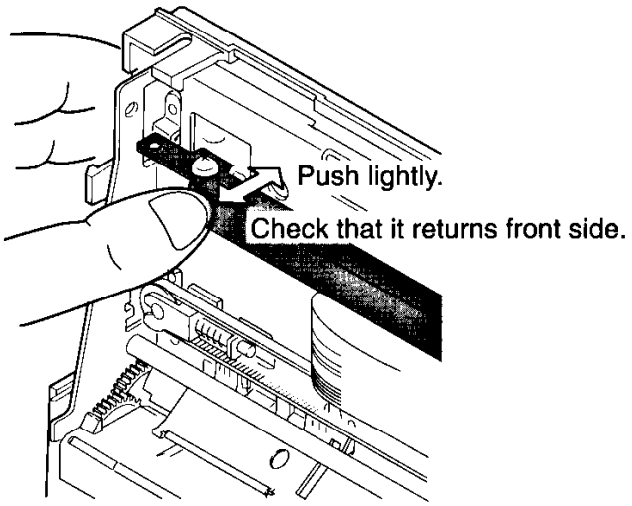


Figure 5-7 Carriage Guide Frame Movement Check

CAUTION

Do not use your hand to carry and move the carriage. It may cause the carriage guide frame to move. To move the carriage, use the carriage belt instead.

6. TROUBLESHOOTING

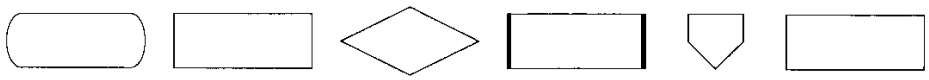
6.1 Troubleshooting

6.1.1 Overview

This chapter consists of the following two sections on subsequent pages: "Error condition diagnosis" for diagnosing the problem when the cause is unknown and "Symptoms" for resolving a problem whose cause is known.
If the cause of the problem is unknown, diagnose the problem. And if the cause is known, follow the countermeasures to resolve the problem.

6.1.2 Troubleshooting cautions

1. Before troubleshooting, make sure the connectors and ribbon cable are properly connected. If the problem occurs at random, be sure to check the connections.
2. When servicing the printer with its outer casing removed and the AC adapter connected, beware of PCB short circuit.
3. Troubleshooting is described in flowchart form.
   The flowchart uses the following diagram symbols.

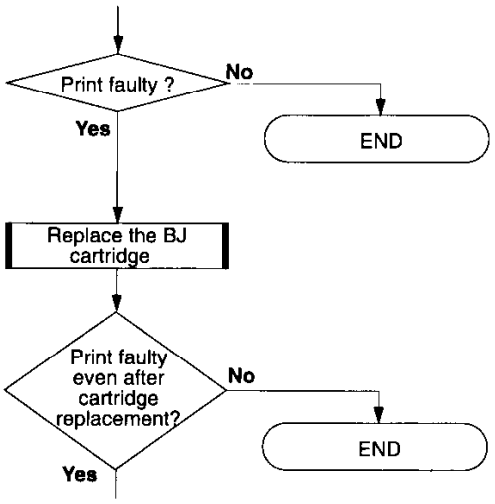


Start/End **Procedure** **Judgement** **Action/Replace** **Jump** **Stop**

4. If there is a problem with the printing quality or paper feeding, first check whether the printer's installation location and paper meet the required specifications. Also check that the paper select lever and the paper thickness lever are set correctly and that the paper is loaded properly.

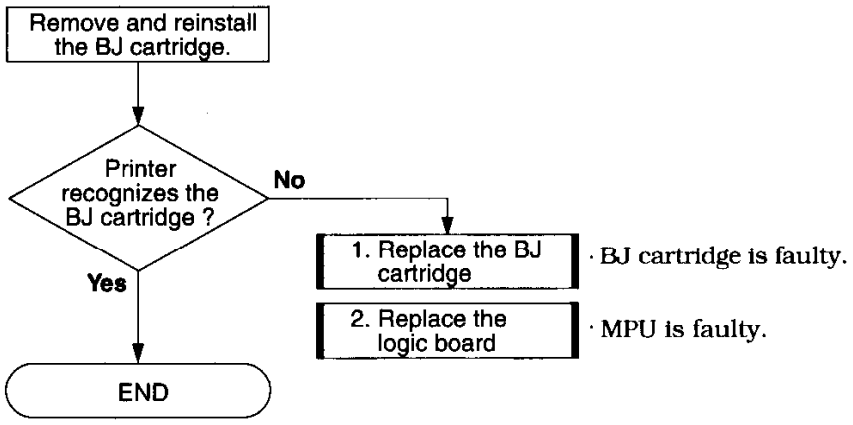
5. After replacing a part or repairing the printer, be sure to execute a test printout to confirm that the problem has been fixed.
   If the problem still persists, troubleshoot again while skipping the steps already executed.

Example 1



6. Some troubleshooting procedures include successive countermeasures. These are steps for resolving the problem.
   After each countermeasure step, execute a test printout to see if the problem has been fixed. If the problem persists, execute the subsequent countermeasure steps.

Example 2
Countermeasure 1: After replacing the BJ cartridge, execute a test printout to check whether the problem has been fixed.
If the problem persists, execute the next countermeasure step 2 which calls for the replacement of the logic board.



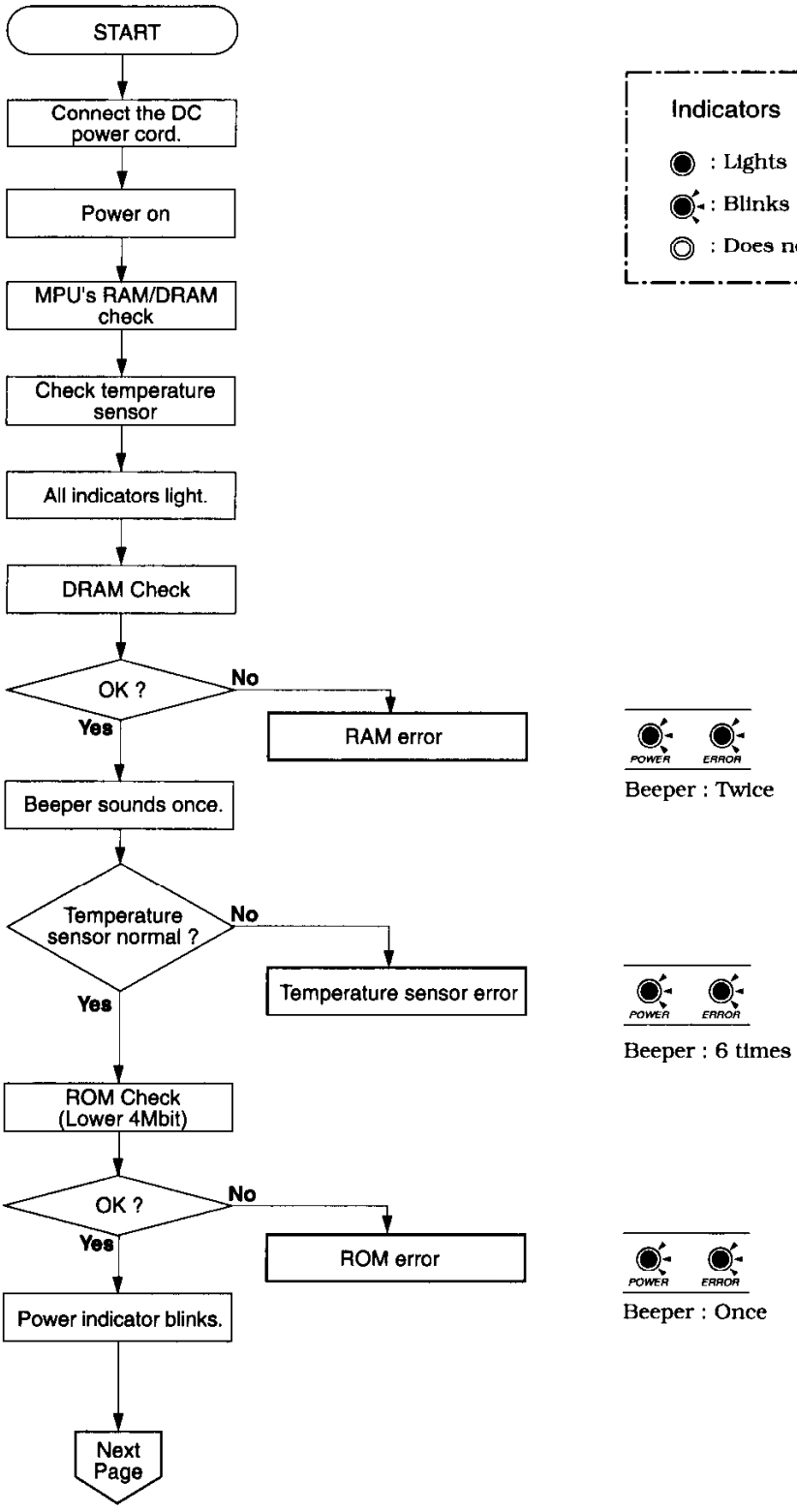
7. After completing the troubleshooting, do not forget to reconnect any connectors and tighten any loosened screws.

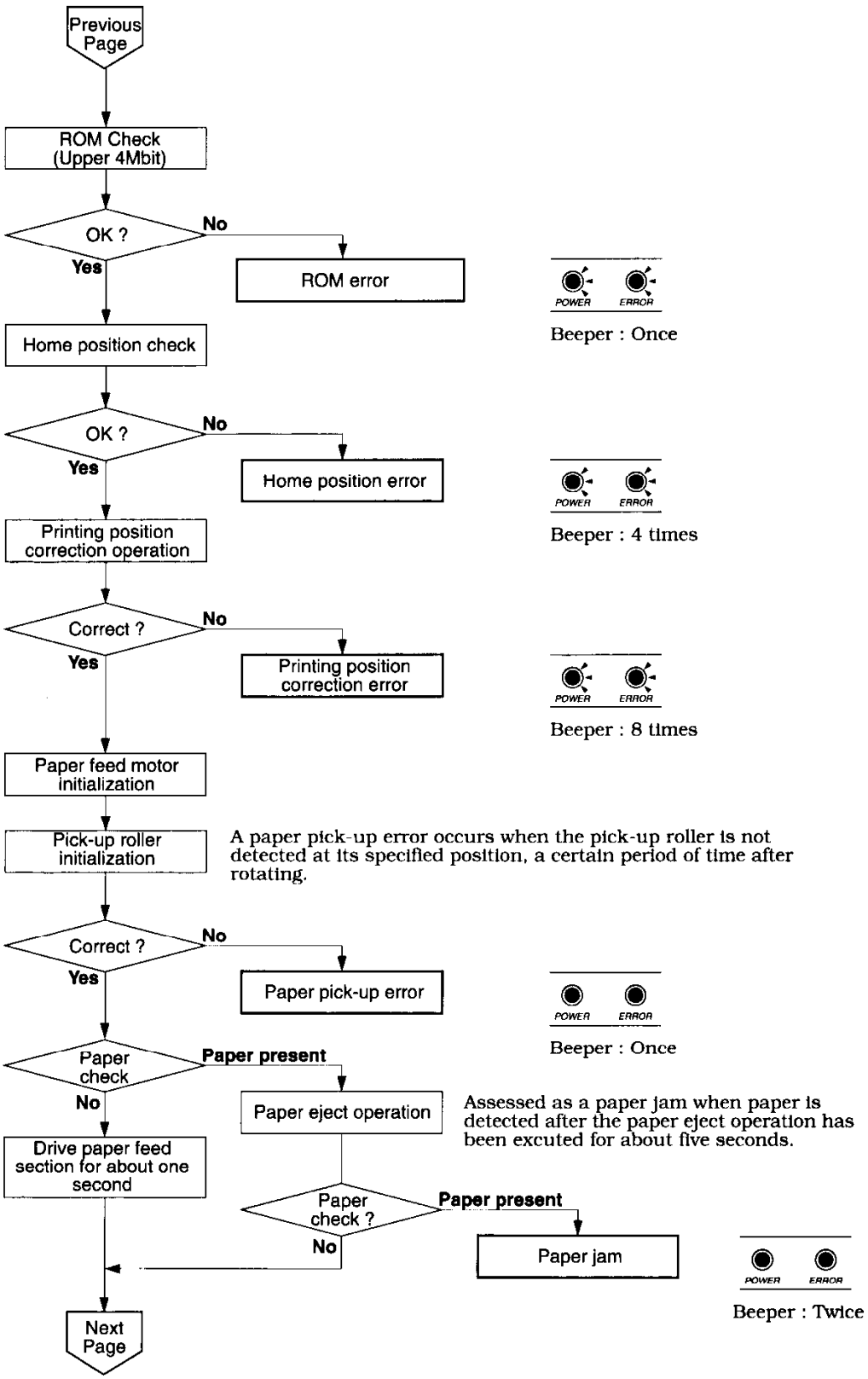
CAUTION

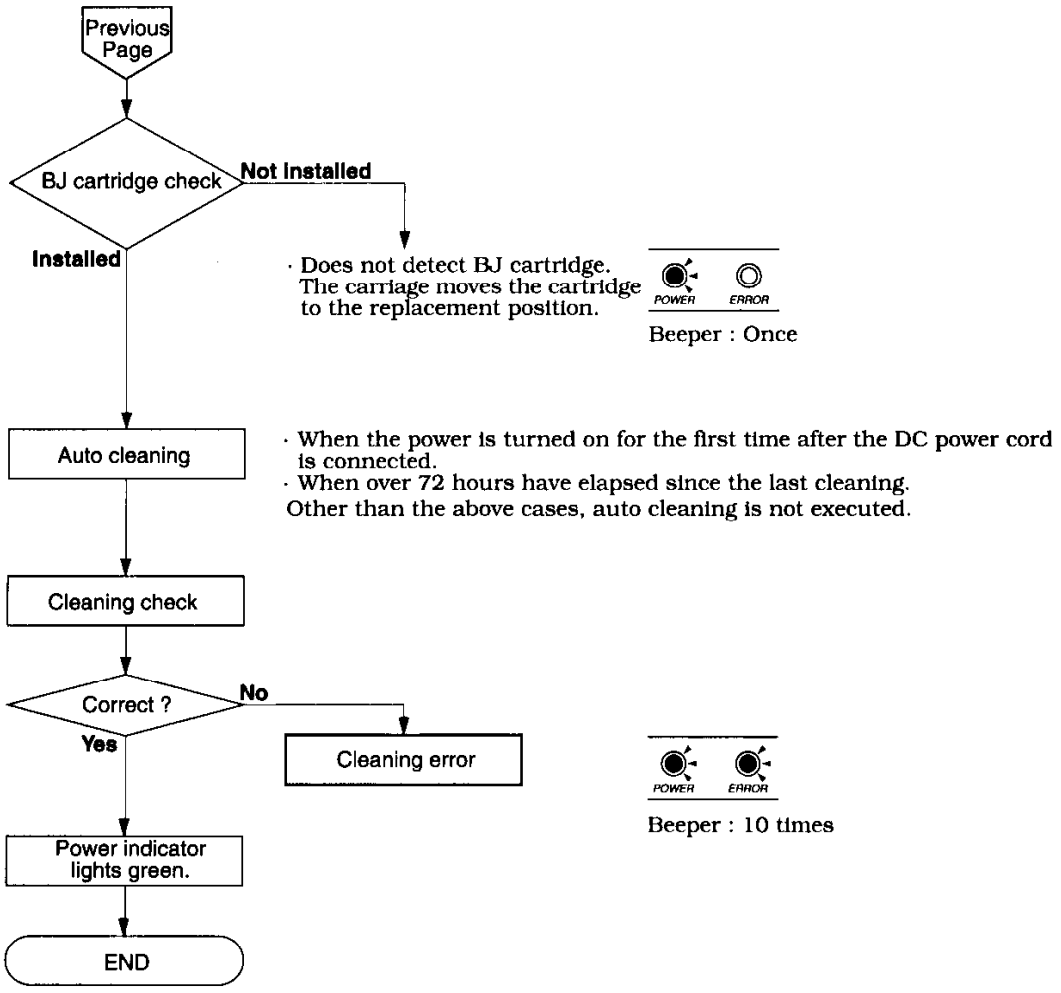
When replacing the logic board, reset the EEPROM, then be sure to check the waste ink absorbers' ink amount on the rear of the printer base unit. Refer to *Part 3: 6.1 Resetting the EEPROM* (page 3-22) and *Part 5: 4.3 Logic Board and Waste Ink Absorber Replacement Cautions* (page 5-5).

6.2 Error Condition Diagnosis

6.2.1 Initial self check




Previous Page
ROM Check (Upper 4Mbit)
OK ?
No
Yes
ROM error
POWER
ERROR
Beeper : Once
Home position check
OK ?
No
Yes
Home position error
POWER
ERROR
Beeper : 4 times
Printing position correction operation
Correct ?
No
Yes
Printing position correction error
POWER
ERROR
Beeper : 8 times
Paper feed motor initialization
Pick-up roller initialization
A paper pick-up error occurs when the pick-up roller is not detected at its specified position, a certain period of time after rotating.
Correct ?
No
Yes
Paper pick-up error
POWER
ERROR
Beeper : Once
Paper check
Paper present
No
Paper eject operation
Assessed as a paper jam when paper is detected after the paper eject operation has been excuted for about five seconds.
Drive paper feed section for about one second
Paper check ?
Paper present
No
Paper jam
POWER
ERROR
Beeper : Twice
Next Page


Previous Page
BJ cartridge check
Not Installed
Installed
· Does not detect BJ cartridge.
The carriage moves the cartridge to the replacement position.
POWER
ERROR
Beeper : Once
Auto cleaning
· When the power is turned on for the first time after the DC power cord is connected.
· When over 72 hours have elapsed since the last cleaning.
Other than the above cases, auto cleaning is not executed.
Cleaning check
Correct ?
No
Yes
Cleaning error
POWER
ERROR
Beeper : 10 times
Power indicator lights green.
END

6.2.2 Error recovery

a) Error display

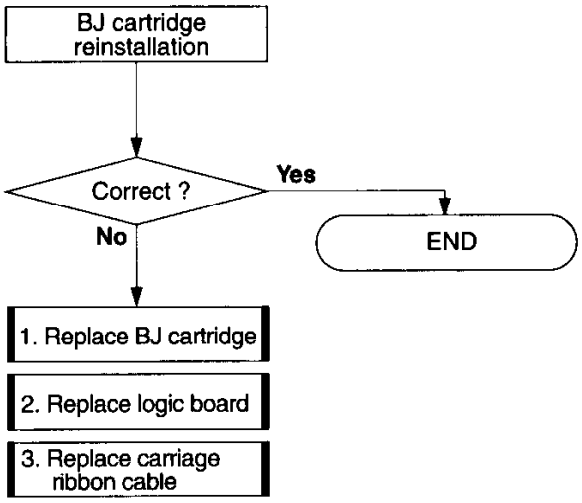
1. ROM Error	**<Cause>** During initialization, the contents in ROM cannot be read. **<Suspected Parts>** Control/CG ROM **<Measure>** Replace logic board.
2. RAM Error	**<Cause>** RAM reading and writing cannot be done properly. **<Suspected Parts>** DRAM **<Measure>** Replace logic board.

When a ROM or RAM error occurs, the correct error may not be displayed. When replacing the logic board reset the EEPROM, then check the amount of waste ink absorbed by the waste ink absorbers in the printer base unit. If necessary, also replace the waste ink absorbers.
(See *Part 5: 4.3 Logic Board and Waste Ink Absorber Replacement Cautions.)*

3. BJ Cartridge Displaced Error

<Cause> The BJ cartridge is not installed properly.
<Suspected Parts> BJ cartridge, logic board, carriage connector

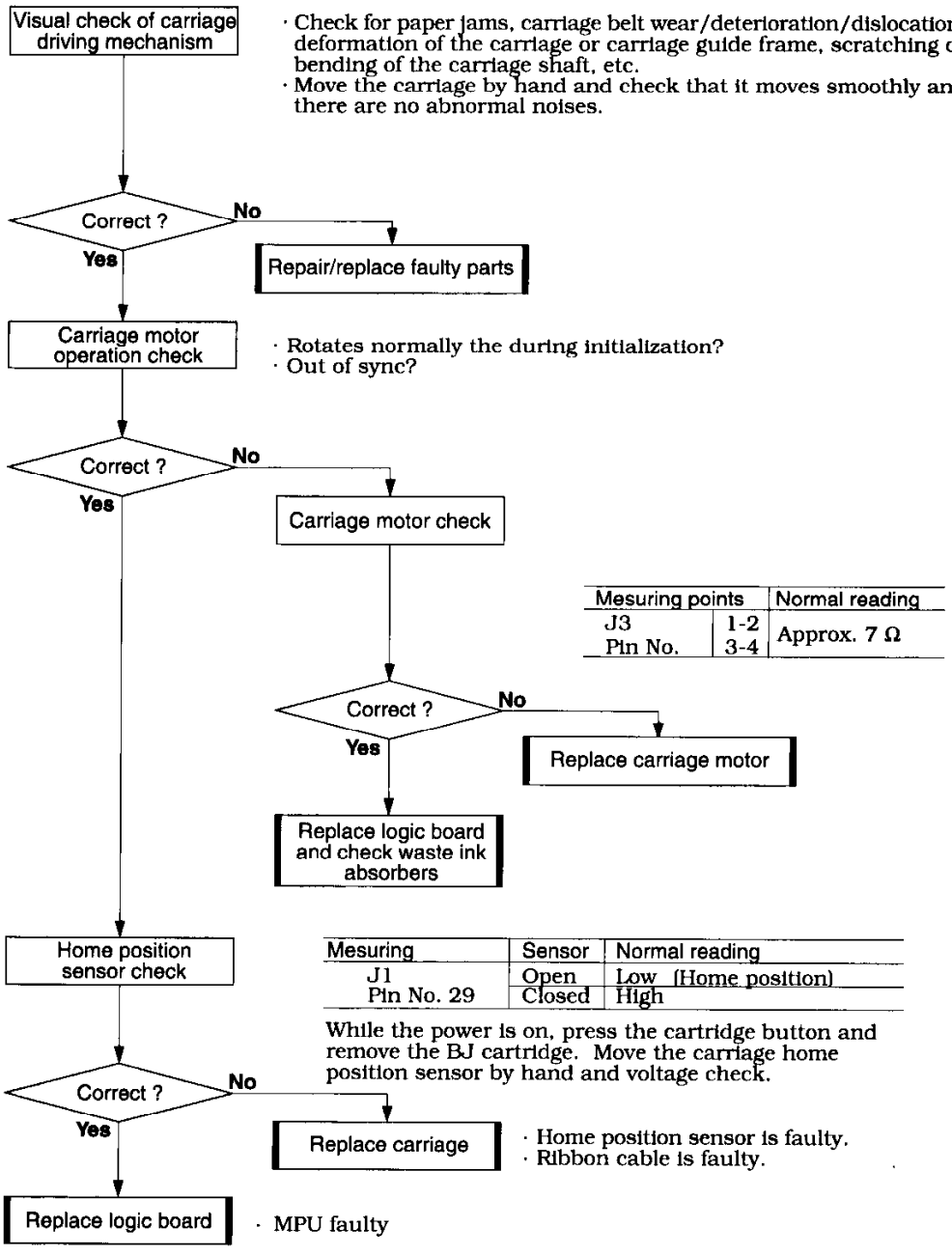
<Measure>



4.Home Position Error

<Cause> The home position cannot be detected.
<Suspected Parts> Home position sensor, carriage motor, logic board, carriage ribbon cable

<Measure>

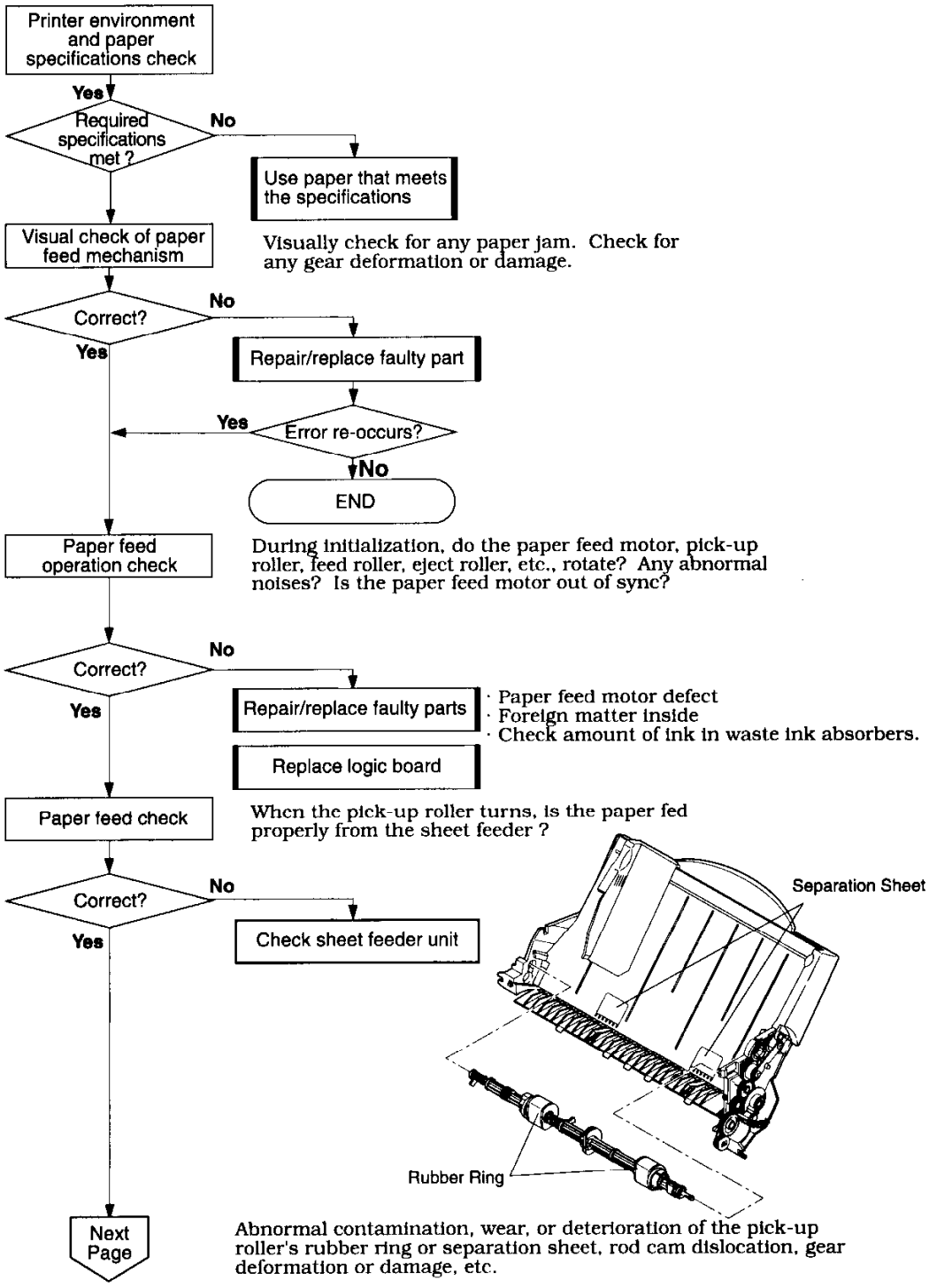


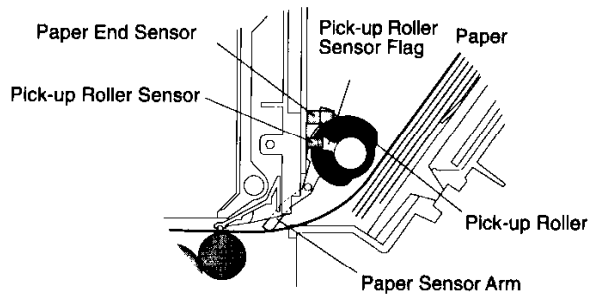
5. Paper Feed Error/Paper Jam

<Cause> •The paper pick-up operation is executed but the paper is not fed.
•The paper delivery operation is executed but the paper is not delivered.

<Suspected Parts> Paper feed mechanism, pick-up roller sensor, paper end sensor, logic board

<Measure>


Printer environment and paper specifications check
Yes
Required specifications met ?
No
Use paper that meets the specifications
Visual check of paper feed mechanism
Visually check for any paper jam. Check for any gear deformation or damage.
Correct?
No
Yes
Repair/replace faulty part
Yes
Error re-occurs?
No
END
Paper feed operation check
During initialization, do the paper feed motor, pick-up roller, feed roller, eject roller, etc., rotate? Any abnormal noises? Is the paper feed motor out of sync?
Correct?
No
Yes
Repair/replace faulty parts
· Paper feed motor defect
· Foreign matter inside
· Check amount of ink in waste ink absorbers.
Replace logic board
Paper feed check
When the pick-up roller turns, is the paper fed properly from the sheet feeder ?
Correct?
No
Yes
Check sheet feeder unit
Separation Sheet
Rubber Ring
Next Page
Abnormal contamination, wear, or deterioration of the pick-up roller's rubber ring or separation sheet, rod cam dislocation, gear deformation or damage, etc.



Previous Page

Pick-up roller sensor flag check

Check for any pick-up roller sensor flag deformation or damage.

Correct ?

No

Yes

Replace pick-up roller shaft.

Pick-up roller sensor check

Measuring points	Sensor	Normal reading
MPU Pin No. 18	Open	Low level
	Closed	High level (Initial condition)

Check by rotating the pick-up roller by hand while the power is on.

Correct ?

No

Yes

Replace logic board.

· Check amount of ink in waste ink absorbers.

Paper end sensor arm check

Move it by hand and check if it moves smoothly. Any deformation or damage ?

Correct ?

No

Yes

Replace paper end sensor arm or repair or replace the faulty part.

Paper end sensor check

Measuring points	Sensor	Normal reading
MPU Pin No. 71	Open	Low level (Paper present)
	Closed	High level (No paper)

Check by moving the paper end sensor arm by hand while the power is on.

Correct ?

No

Yes

Replace logic board.

· Check amount of ink in waste ink absorbers.

END

6. Waste Ink Full Error

<Cause> The waste ink absorbers' estimated waste ink amount has reached 100%.
<Suspected Parts> Waste ink absorbers, logic board
<Measures> 1. Reset the EEPROM and replace the waste ink absorbers.
2. Replace logic board.

7. Temperature Sensor Error

<Cause> Thermistor is abnormal.
<Suspected Parts> Thermistor
<Measures> Replace logic board.

8. Printing Position Correction Error

<Cause> The printing position correction value cannot be detected.
<Suspected Parts> Carriage motor, logic board, home position sensor
<Measures> See countermeasures for home position error.

9. Cleaning Error

<Cause> The cleaning is not executed properly.
<Suspected Parts> Home position sensor, sensor arm, purge unit, carriage ribbon cable, logic board

<Measure>

Visual check of paper feed system operation

During initialization, do the paper feed motor, pick-up roller, feed roller, eject roller, etc., rotate? Any abnormal noises? Is the paper feed motor out of sync?

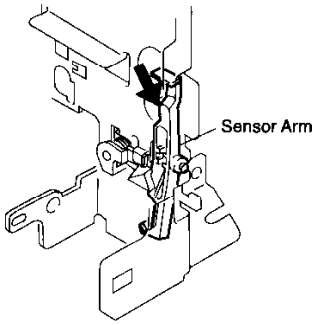
Correct ?

No

1. Repair/Replace faulty part
2. Replace logic board

Yes

Sensor arm check



Move it by hand and see if it moves smoothly. Also, any deformation or damage at the locations indicated by the arrows ?

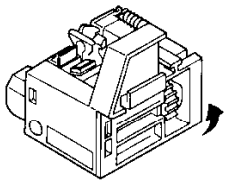
Correct ?

Yes

Replace sensor arm or repair/replace faulty part.

No

Purge unit check



Remove the purge unit and move it as shown by the arrow to check if it moves smoothly. Any gear deformation or damage?

Correct ?

No

Replace purge unit

Yes

Disassemble and check the paper feed motor drive switching mechanism

If the gear is deformed or damaged, dissemble and check the paper feed motor drive switching mechanism. Refer to *Part 4: 3.4.2 4) Switching the paper feed motor drive transmission* (page 4-27).

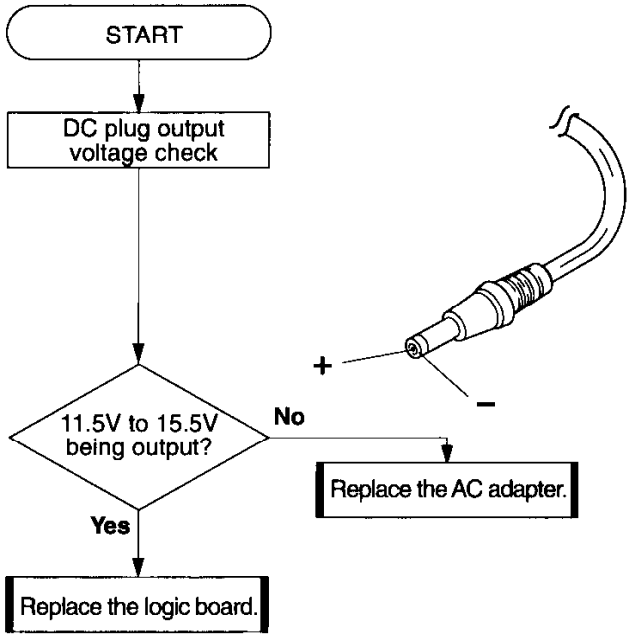
b) Symptoms

1. The Power Does Not Turn On

<Symptom> •The power does not turn on even when the *POWER* button is pressed.
•Even when DC power is supplied, initialization is not executed.

<Cause> The AC adapter and/or logic board is faulty.

<Measure>

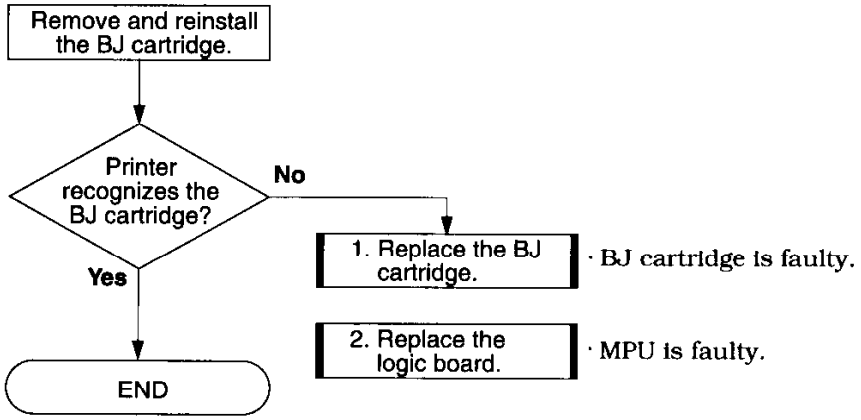


2. The Printer Does Not Recognize The BJ

<Symptom> •The BJ cartridge installed is not recognized.
•The installed cartridge is recognized incorrectly.

<Cause> •Faulty contacts between the BJ cartridge and carriage.
•The BJ cartridge is faulty.
•The carriage ribbon cable is faulty.
•The logic board is faulty.

<Measure>

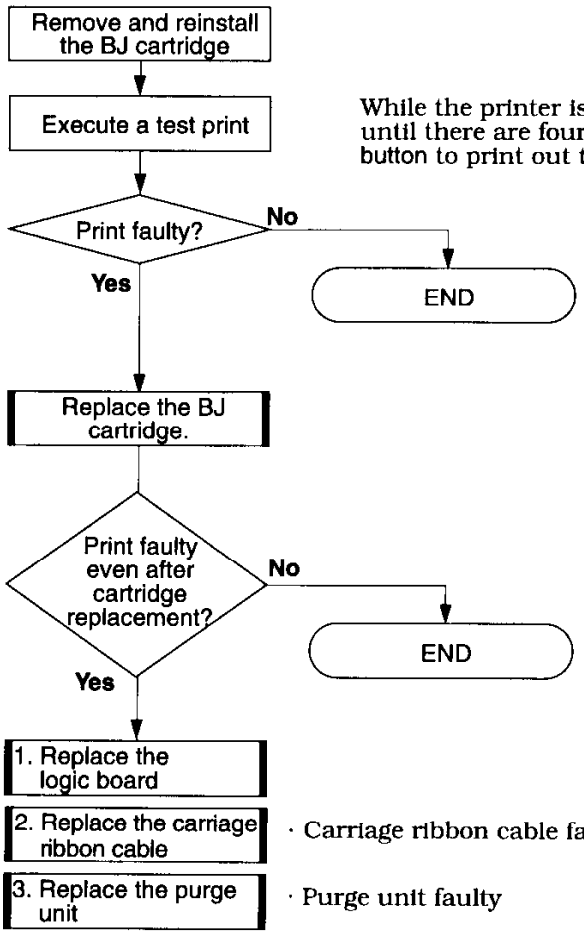


3. Faulty Printing <1>: No Printing

<Symptom> •The printer does not print at all.
•Printing stops mid-way.
•Only a certain color is not printed.

<Cause> •The ink has run out or the BJ cartridge is faulty.
•The logic board, the carriage ribbon cable, or the purge unit is faulty.

<Measure>



While the printer is on, hold down the *POWER* button until there are four beeps. Then release the *POWER* button to print out the nozzle check pattern.

· Carriage ribbon cable faulty

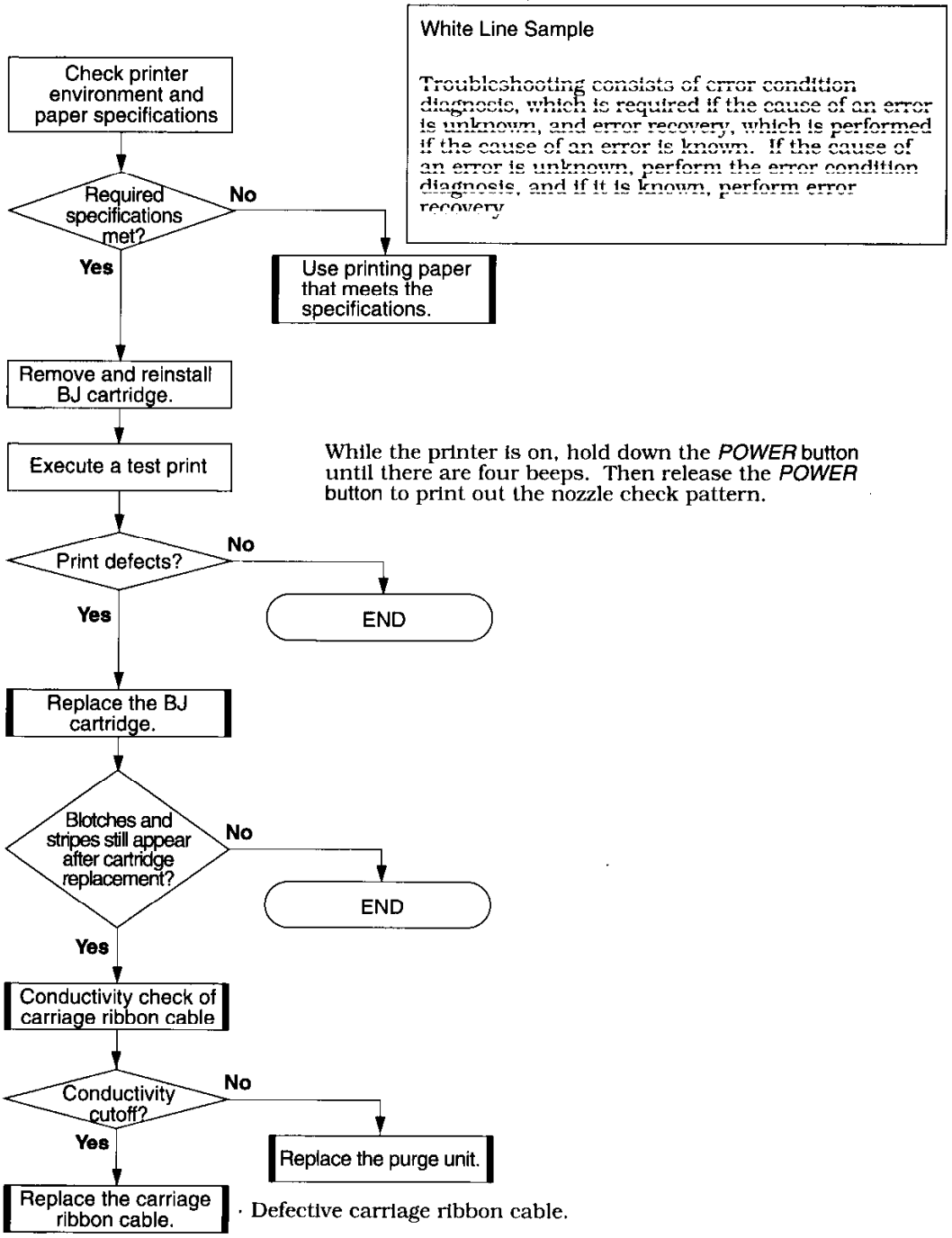
· Purge unit faulty

4 Faulty Printing <2>: White Stripes Appear

<Symptom> •There is blotching.
•There are white stripes.
•The specified dots are not printed.

<Cause> •The BJ cartridge or cartridge contacts are faulty.
•The carriage ribbon cable is faulty.
•The purge unit or paper feed mechanism (missing gear tooth) is faulty.

<Measure>


White Line Sample
Troubleshooting consists of error condition diagnosis, which is required if the cause of an error is unknown, and error recovery, which is performed if the cause of an error is known. If the cause of an error is unknown, perform the error condition diagnosis, and if it is known, perform error recovery
Check printer environment and paper specifications
Required specifications met?
No
Yes
Use printing paper that meets the specifications.
Remove and reinstall BJ cartridge.
Execute a test print
While the printer is on, hold down the POWER button until there are four beeps. Then release the POWER button to print out the nozzle check pattern.
Print defects?
No
Yes
END
Replace the BJ cartridge.
Blotches and stripes still appear after cartridge replacement?
No
END
Yes
Conductivity check of carriage ribbon cable
Conductivity cutoff?
No
Yes
Replace the purge unit.
Replace the carriage ribbon cable.

· Defective carriage ribbon cable.

5 Faulty Printing <3>: Other Print Problem

Symptom	Check Item	Measures
Ink smearing	Ink mist on the platen.	Use a soft cloth moistened with water to clean.
	Ink has solidified around the head nozzles. (No paper soiling during paper feeding and delivery.)	Executes the cleaning operation while refering to *Part3*: 3.3 Cleaning the BJ Cartridge. If the problem persists, replace the BJ cartridge.
	Ink has solidified (or paper bits have stuck) around the purge unit's head wiper or head capping area.	Replace purge unit.
	Ink has adhered to the paper transport parts. (The paper is already soiled by the time it reaches the platen.)	Disassemble the paper transport parts and use a soft cloth damp to clean.
Spur tracks appear	Ink has adhered to the spurs.	Use a soft toothbrush to clean.
	The spurs are deformed.	Replace the spurs.
Vertically-oriented printed lines are misaligned.	The BJ cartridge is installed incorrectly.	Reinstall the BJ cartridge correctly.
	The paper thickness lever is not set properly.	Set the lever at the specified position.
	The problem occurs when the user's BJ cartridge (causing the problem) is installed in a normally-operating printer.	Replace the BJ cartridge.
	The head gap has not been set correctly.*	Adjust the head gap. (See *5. Adjustments* on page 5-8.)
Corrugated printing	The carriage guide frame is deformed.	Replace the carriage guide frame.
	Frictional wear between the carriage base and carriage shaft.	Replace the carriage unit.
Uneven print density	Check the printing mode.	Set the desired printing mode.
	The BJ cartridge is faulty.	Replace the BJ cartridge.

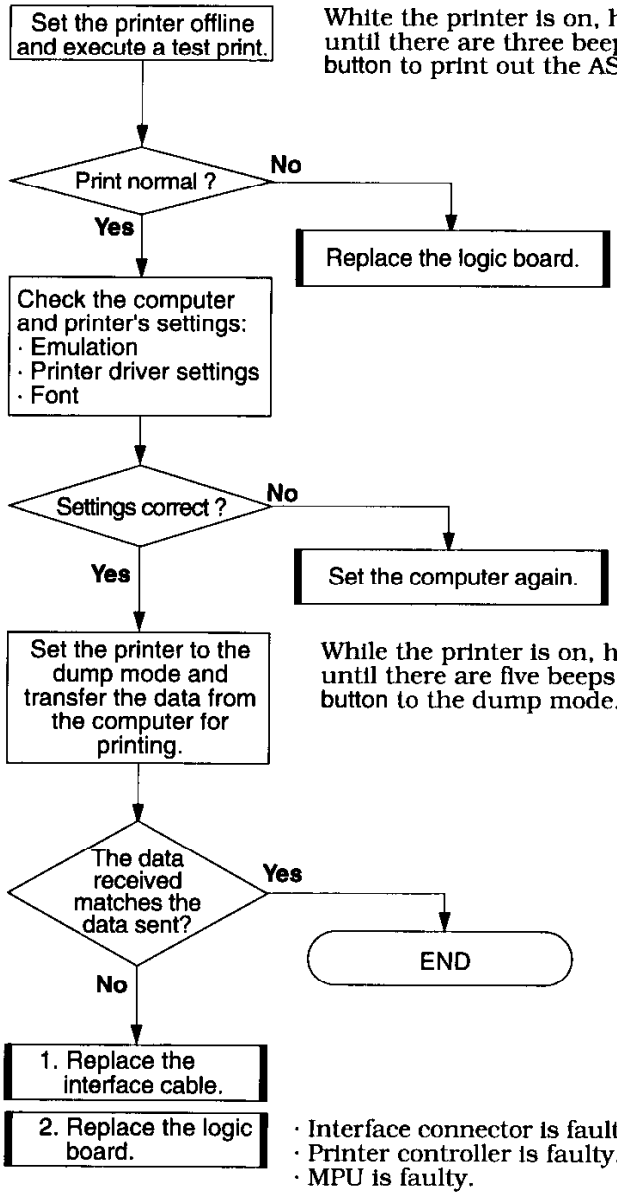
* Checking the head gap is difficult. Readjust the head gap and then check whether it fixes the problem.

6. Faulty Interface

<Symptom> •Nothing is printed.
•An unspecified font is printed.
•An unspecified color is printed.

<Cause> •The printer driver setting is faulty.
•The interface cable is faulty.
•The printer's logic board is faulty.

<Measure>


Set the printer offline and execute a test print.
White the printer is on, hold down the POWER button until there are three beeps. Then release the POWER button to print out the ASCII pattern.
Print normal ?
No
Yes
Replace the logic board.
Check the computer and printer's settings:
· Emulation
· Printer driver settings
· Font
Settings correct ?
No
Yes
Set the computer again.
Set the printer to the dump mode and transfer the data from the computer for printing.
While the printer is on, hold down the POWER button until there are five beeps. Then release the POWER button to the dump mode.
The data received matches the data sent?
Yes
END
No
1. Replace the interface cable.
2. Replace the logic board.
· Interface connector is faulty.
· Printer controller is faulty.
· MPU is faulty.

7. LOCATION & SIGNAL ASSIGNMENT

7.1 Logic Board

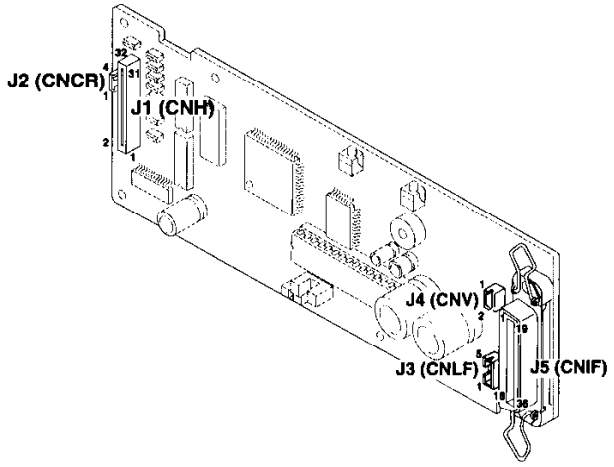


Figure 5-8 Logic Board

J1 / CNH (Ribbon cable connector)

Pin No.	Signal name	IN/OUT	Description
1	GND	...	GND for Warm-up heater voltage VH
2	HEATER	OUT	Warm-up heater voltage VH and Detection signal
3	$\overline{\text{HSEG5}}$	OUT	SEG5 heat enable
4	$\overline{\text{HSEG6}}$	OUT	SEG6 heat enable
5	$\overline{\text{HSEG8}}$	OUT	SEG8 heat enable
6	HCOM1	OUT	COM1 heat enable
7	HCOM2	OUT	COM2 heat enable
8	GND	...	GND for Warm-up heater voltage VH
9	HEATER	OUT	Warm-up heater voltage VH and Detection signal
10	$\overline{\text{HSEG4}}$	OUT	SEG4 heat enable
11	$\overline{\text{HSEG1}}$	OUT	SEG1 heat enable
12	HCOM8	OUT	COM8 heat enable
13	$\overline{\text{HSEG2}}$	OUT	SEG2 heat enable
14	HCOM4	OUT	COM4 heat enable
15	$\overline{\text{HSEG3}}$	OUT	SEG3 heat enable
16	HCOM7	OUT	COM7 heat enable
17	GND	...	Ground
18	ID2	IN	BJ cartridge recognition signal (See Table 5-2.)
19	HCOM6	OUT	COM6 heat enable
20	ID3	IN	(Not used)
21	HCOM5	OUT	COM5 heat enable
22	ID1	IN	BJ cartridge recognition signal (See Table 5-2.)
23	HRANK1	IN	Head rank sense
24	HRANK2	IN	Head rank sense
25	HRANK3	IN	Head rank sense
26	GND	...	Ground for Head rank
27	HCOM3	OUT	COM3 heat enable
28	$\overline{\text{HSEG7}}$	OUT	SEG7 heat enable
29	HPS	IN	Home position sense High / Low (sense)
30	GND	...	Ground
31	HPS-A	OUT	Photo LED drive
32	Not used		

Cartridge types BC-02, BC-05 and BC-06 photo can be distinguished with combinations of the Pin No. #18 and #22 of the connector J1 as shown in the table below.

TABLE 5-2 BJ CARTRIDGE RECOGNITION

Pin No.	Signal name	Cartridge type		
		BC-02	BC-05	BC-06 photo
18	ID2	Low	High	High
22	ID1	High	Low	High

J2 / CNCR (Carriage motor connector)

Pin No.	Signal name	IN/OUT	Description
1	CRA	OUT	Carriage motor phase A
2	$\overline{\text{CRA}}$	OUT	Carriage motor phase $\overline{\text{A}}$
3	CRB	OUT	Carriage motor phase B
4	$\overline{\text{CRB}}$	OUT	Carriage motor phase $\overline{\text{B}}$

J3 / CNLF (Paper feed motor connector)

Pin No.	Signal name	IN/OUT	Description
1	LFA	OUT	Paper feed motor phase A
2	$\overline{\text{LFA}}$	OUT	Paper feed motor phase $\overline{\text{A}}$
3	VM	...	Common
4	$\overline{\text{LFB}}$	OUT	Paper feed motor phase $\overline{\text{B}}$
5	LFB	OUT	Paper feed motor phase B

J4 / CNV (DC power connector)

Pin No.	Signal name	IN/OUT	Description
1	VIN	IN	+ 13 VDC
2	GND	...	Ground

J5 / CNIF (Interface connector)

Pin No.	Signal name	IN/OUT	Description
1	$\overline{\text{STROBE}}$	IN	See *Part2: 2.3 Interface Specifications* for details.
2	DATA1	IN	
3	DATA2	IN	
4	DATA3	IN	
5	DATA4	IN	
6	DATA5	IN	
7	DATA6	IN	
8	DATA7	IN	
9	DATA8	IN	
10	$\overline{\text{ACKNLG}}$	OUT	
11	BUSY	OUT	
12	P.E.	OUT	
13	SELECT	OUT	
14	$\overline{\text{AUTO FEED XT}}$	IN	
15	N.C	...	
16	INIT	IN	
17	GND	...	
18	N.C	...	
19	$\overline{\text{STROBE}}$-RET	...	
20	DATA1-RET	...	
21	DATA2-RET	...	
22	DATA3-RET	...	
23	DATA4-RET	...	
24	DATA5-RET	...	
25	DATA6-RET	...	
26	DATA7-RET	...	
27	DATA8-RET	...	
28	ACKNLG-RET	...	
29	BUSY-RET	...	
30	P.E.-RET	...	
31	$\overline{\text{INIT}}$	IN	
32	$\overline{\text{ERROR}}$	OUT	
33	GND	...	
34	N.C	...	
35	+5.0V	...	
36	$\overline{\text{SELECT IN}}$	IN	

CARRIAGE RIBBON CABLE

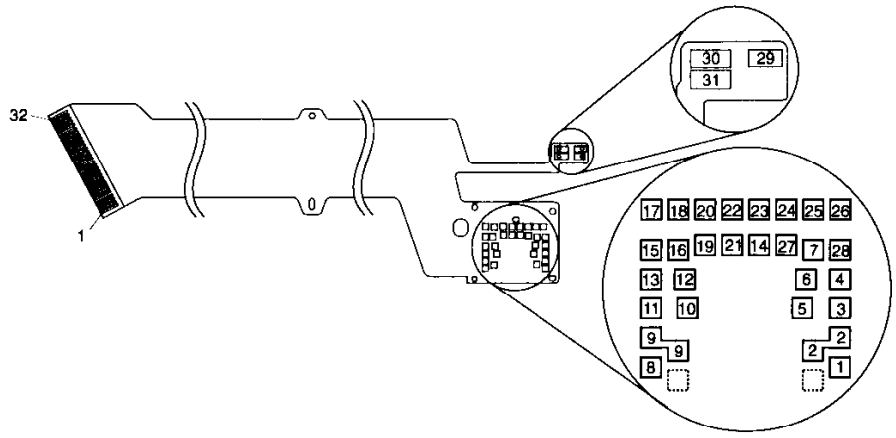


Figure 5-9 Carriage Ribbon Cable

Pin No.	Signal name	IN/OUT	Description	◄► BJ cartridge pin no.
1	GND	...	GND for Warm-up heater voltage VH	24
2	HEATER	OUT	Warm-up heater voltage VH and Detection signal	22,23
3	$\overline{\text{HSEG5}}$	OUT	SEG5 heat enable	20
4	$\overline{\text{HSEG6}}$	OUT	SEG6 heat enable	19
5	$\overline{\text{HSEG8}}$	OUT	SEG8 heat enable	17
6	HCOM1	OUT	COM1 heat enable	16
7	HCOM2	OUT	COM2 heat enable	15
8	GND	...	GND for Warm-up heater voltage VH	1
9	HEATER	OUT	Warm-up heater voltage VH and Detection signal	2,3
10	$\overline{\text{HSEG4}}$	OUT	SEG4 heat enable	8
11	$\overline{\text{HSEG1}}$	OUT	SEG1 heat enable	6
12	HCOM8	OUT	COM8 heat enable	9
13	$\overline{\text{HSEG2}}$	OUT	SEG2 heat enable	6
14	HCOM4	OUT	COM4 heat enable	13
15	$\overline{\text{HSEG3}}$	OUT	SEG3 heat enable	7
16	HCOM7	OUT	COM7 heat enable	10
17	GND	...	Ground	25
18	ID2	IN	BJ cartridge recognition signal	26
19	HCOM6	OUT	COM6 heat enable	11
20	ID3	IN	(Not used)	27
21	HCOM5	OUT	COM5 heat enable	12
22	ID1	IN	BJ cartridge recognition signal	28
23	HRANK1	IN	Head rank sense	29
24	HRANK2	IN	Head rank sense	30
25	HRANK3	IN	Head rank sense	31
26	GND	...	Ground for Head rank	32
27	HCOM3	OUT	COM3 heat enable	14
28	$\overline{\text{HSEG7}}$	OUT	SEG7 heat enable	18
29	HPS	IN	Home position sense High / Low (sense)	-
30	GND	...	Ground	-
31	HPS-A	OUT	Photo LED drive	-
32	Not used			-

Cartridge types BC-02, BC-05 and BC-06 can be distinguished with combinations of the ID1 and ID2 signals as shown in the table below.

J1 pin no.	BJ cartridge pin no.	Signal name	Cartridge type		
			BC-02	BC-05	BC-06
18	26	ID2	Low	High	High
22	28	ID1	High	Low	High

BJ CARTRIDGES

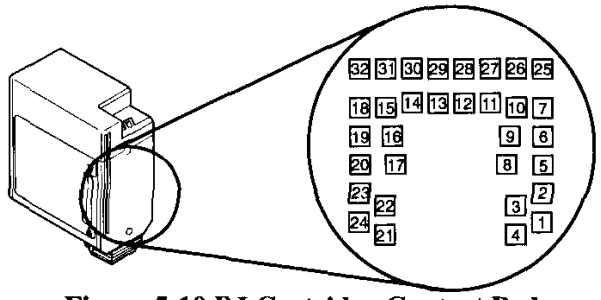


Figure 5-10 BJ Cartridge Contact Pad

BLACK BJ CARTRIDGE

Pin No.	Signal name	IN/OUT	Description	J1 pin no.
1	HGND1	OUT	GND for Warm-up heater voltage VH	8
2	HEATER1	IN	Warm-up heater voltage VH and Detection signal	9
3	TMPSEN1A	IN	Temperature sensor 1, Anode (Not Used)	9
4	TMPSEN1C	OUT	Temperature sensor 1, Cathode (Not Used)	-
5~8	$\overline{\text{SEG1~4}}$	IN	SEG1~4 heat enable	11,13,15,10
9~16	COM1~8	IN	COM1~8 heat enable	12,16,19,21 14,27,7,6
17~20	$\overline{\text{SEG8~5}}$	IN	SEG8~5 heat enable	5,28,4,3
21	TMPSEN2C	OUT	Temperature sensor 2, Cathode (Not Used)	-
22	TMPSEN2A	IN	Temperature sensor 2, Anode (Not Used)	2
23	HEATER2	IN	Warm-up heater voltage VH and Detection signal	2
24	HGND2	OUT	GND for Warm-up heater voltage VH	1
25	GND	GND		17
26	ID2	OUT	BJ cartridge recognition signal	18
27	Not used	...		20
28	ID1	OUT	BJ cartridge recognition signal	22
29~32	HRANK		Head rank	23,24,25,26

COLOR BJ CARTRIDGE

Pin No.	Signal name	IN/OUT	Description	J1 pin no.
1	HGND1	OUT	GND for Warm-up heater voltage VH	8
2	Not used	...		9
3	HEATER1	IN	Warm-up heater voltage VH and Detection signal	9
4	Not used	...		-
5~8	$\overline{\text{SEG1~4}}$	IN	SEG1~4 heat enable	11,13,15,10
9~10	COM1~2	IN	COM1~2 heat enable (Cyan)	12,16
11	Not used	...		19
12~13	COM4~5	IN	COM4~5 heat enable (Magenta)	21,14
14	Not used	...		27
15~16	COM7~8	IN	COM7~8 heat enable (Yellow)	7,6
17~20	$\overline{\text{SEG8~5}}$	IN	SEG8~5 heat enable	5,28,4,3
21	Not used	...		-
22	HEATER2	IN	Warm-up heater voltage VH and Detection signal	2
23	Not used	...		2
24	HGND2	OUT	GND for Warm-up heater voltage VH	1
25	GND	GND		17
26	ID2	OUT	BJ cartridge recognition signal	18
27	GND	GND		20
28	ID1	OUT	BJ cartridge recognition signal	22
29~32	HRANK		Head rank	23,24,25,26

8. CIRCUIT DIAGRAM

8.1 Parts Layout

8.1.1 Logic board

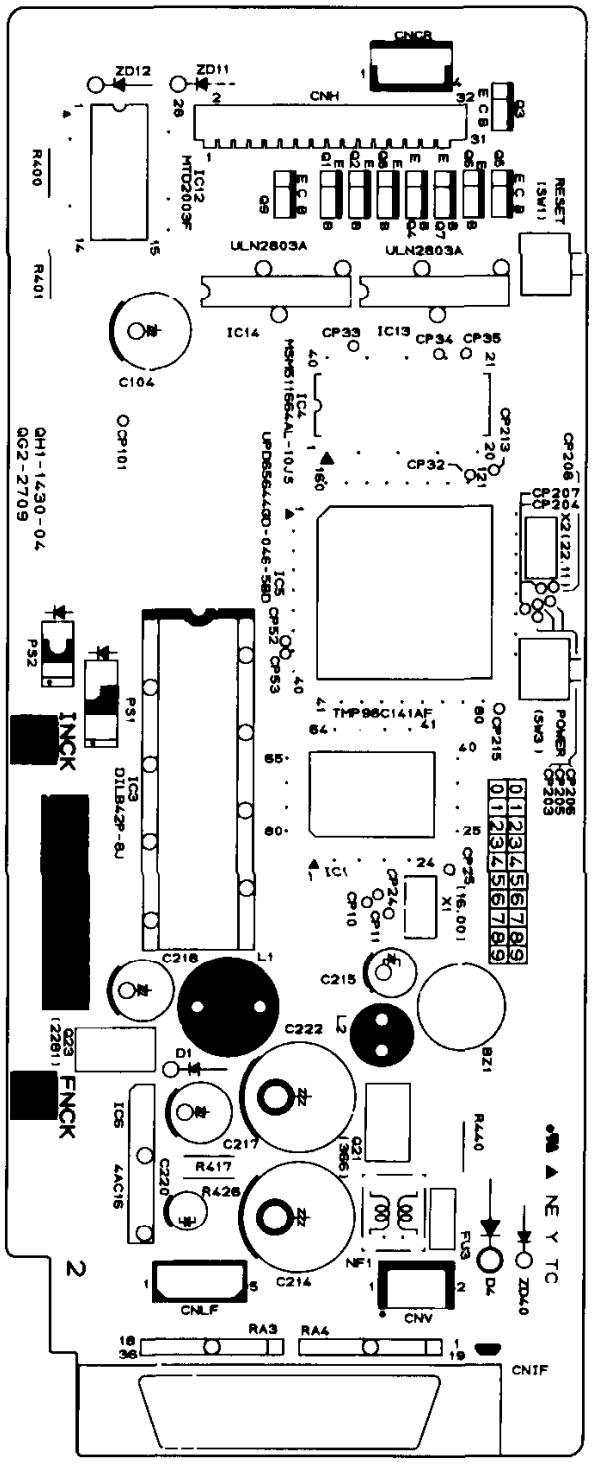


Figure 5-11 Logic Board (Top View)

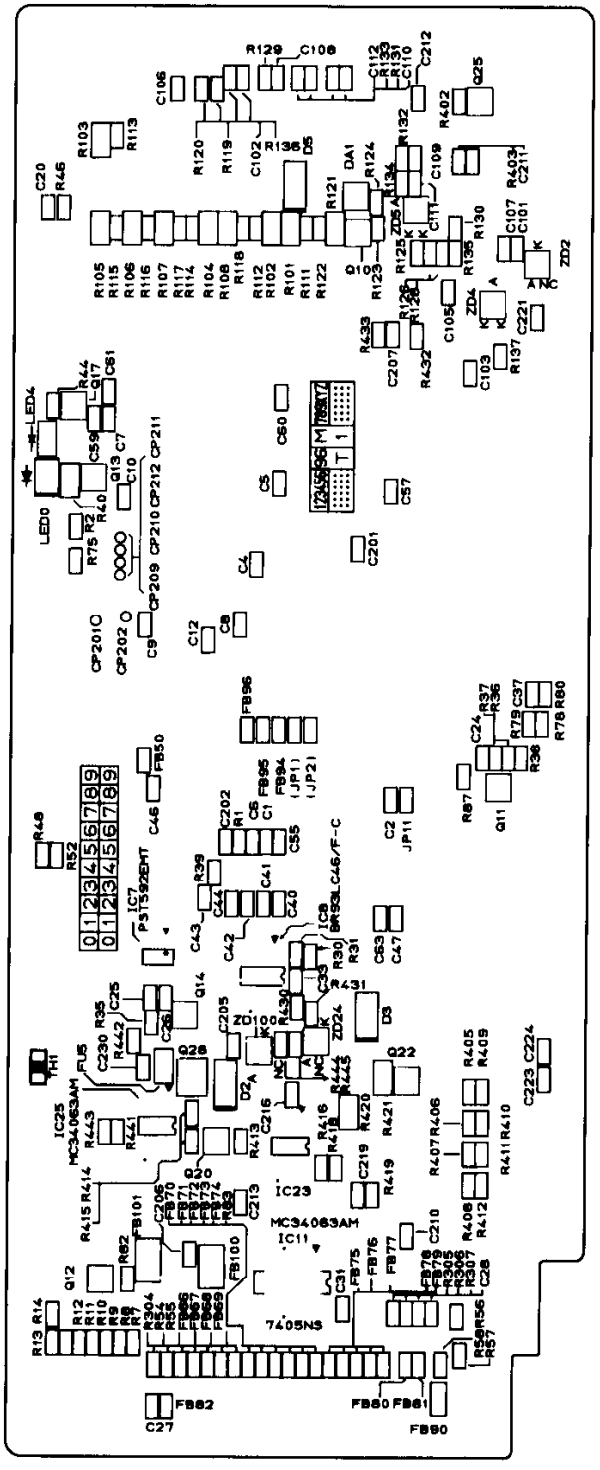


Figure 5-12 Logic Board (Bottom View)

BJC-240

PARTS CATALOG

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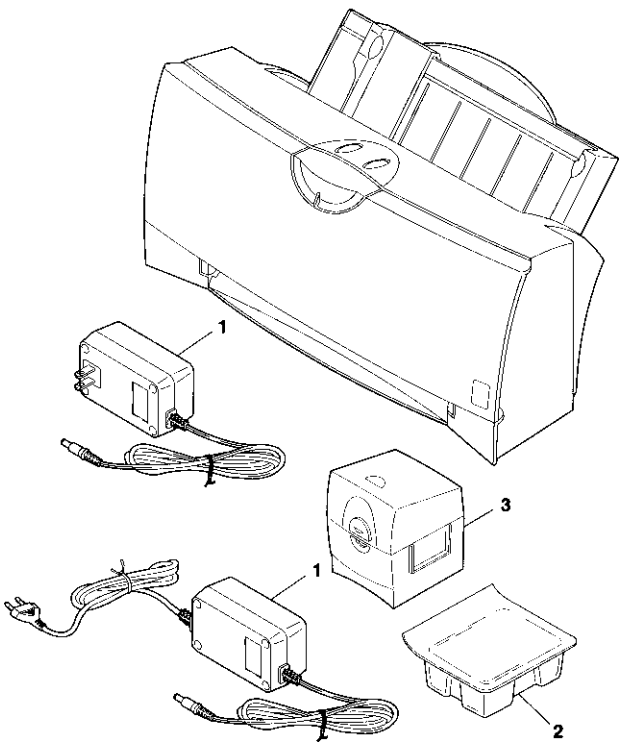
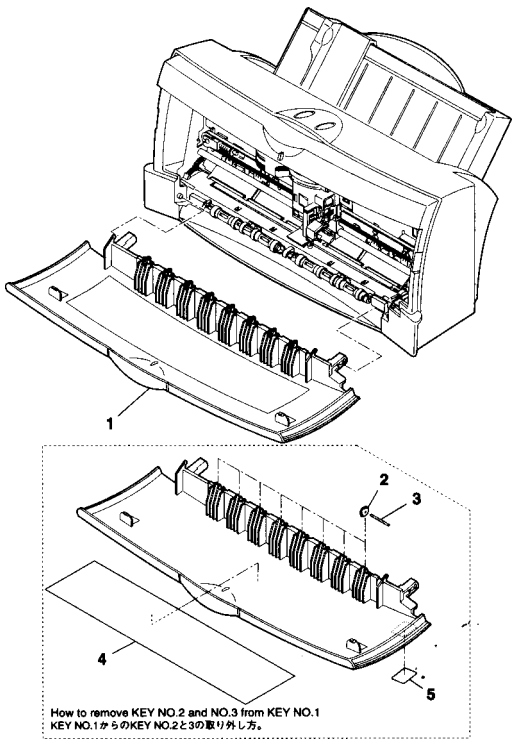
FIGURE 1 PRINTER SET



NUM.	PART #	DESCRIPTION
1 - 1	QH3-3173-000	AC ADAPTER: 120V 60HZ
1	QH3-3174-000	AC ADAPTER: 220-240V 50HZ
1	QH3-3175-000	AC ADAPTER: 240V 50HZ UK
1	QH3-3176-000	AC ADAPTER: 240V 50HZ AUS
2	NPN	BJ CARTRIDGE CONTAINER
3	NPN	BLACK BJ CARTRIDGE PACK
3	NPN	COLOR BJ CARTRIDGE PACK

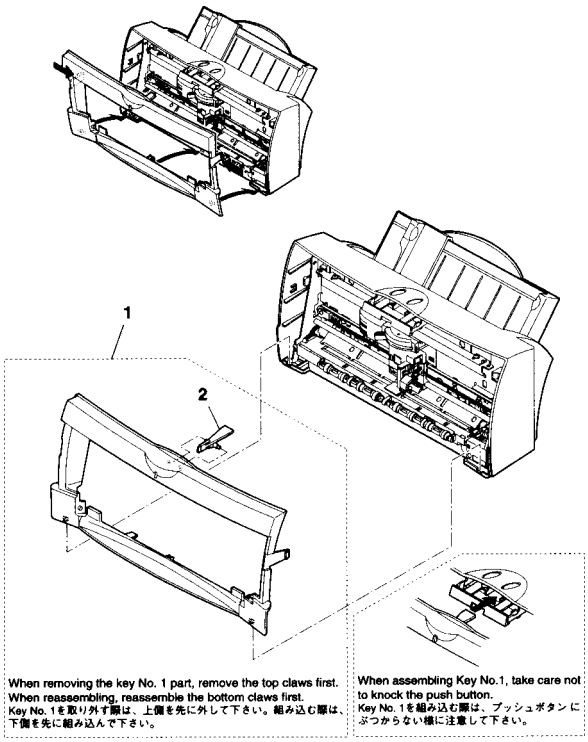
FIGURE 2 FRONT COVER



NUM.	PART #	DESCRIPTION
2 - 1	QG5-0767-000	FRONT COVER UNIT
2	QB1-1952-000	SPUR
3	QB1-1039-000	SPUR SHAFT
4	QB1-2264-000	LABEL INSTALL
5	QB1-2049-000	LABEL COLOR BUBBLE JET

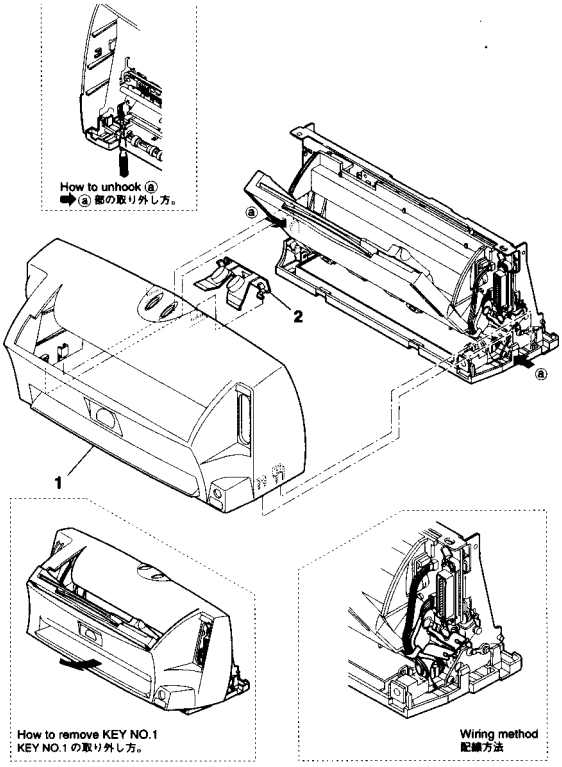
Canon

FIGURE 3 UPPER COVER


1
2
When removing the key No. 1 part, remove the top claws first.
When reassembling, reassemble the bottom claws first.
Key No. 1を取り外す際は、上側を先に外して下さい。組み込む際は、下側を先に組み込んで下さい。
When assembling Key No.1, take care not to knock the push button.
Key No. 1を組み込む際は、プッシュボタンにぶつからない様に注意して下さい。

NUM.	PART #	DESCRIPTION
3 - 1	QG5-0766-000	UPPER CASE UNIT
4	QB1-2256-000	GUIDE INDICATOR

FIGURE 4 REAR COVER



NUM.	PART #	DESCRIPTION
4 - 1	QB1-2258-000	COVER REAR
2	QB1-2255-000	BUTTON, PUSH

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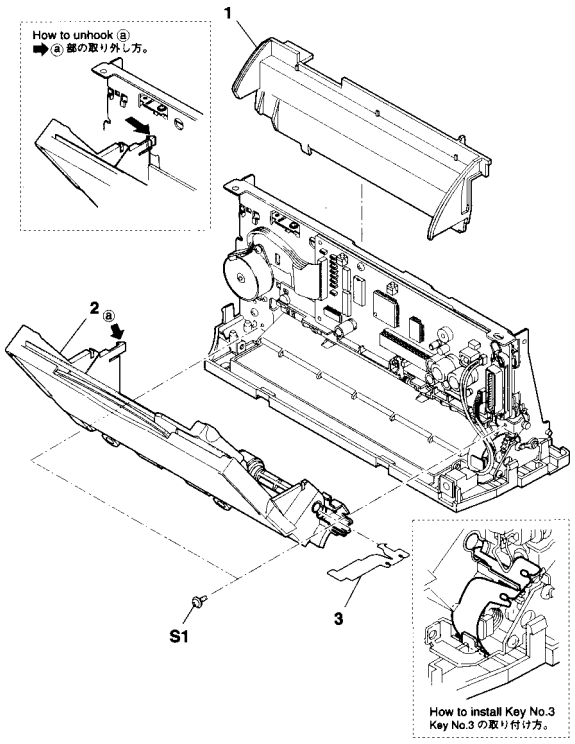
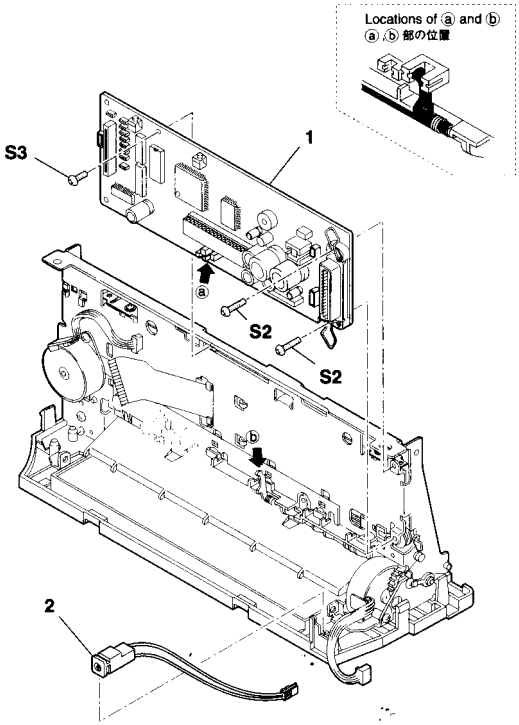
FIGURE 5 CUT SHEET FEEDER UNIT



NUM.	PART #	DESCRIPTION
5 - 1	QB1-2017-000	COVER LOGIC BOARD
2	QG5-0595-000	SHEET FEEDER UNIT
3	QG5-2267-000	SHEET, PROTECT

FIGURE 6 ELECTRICAL PARTS



NUM.	PART #	DESCRIPTION
6 - 1	QG2-2709-040	LOGIC BOARD ASS'Y
2	QG2-2645-000	DC CONNECTOR ASS'Y

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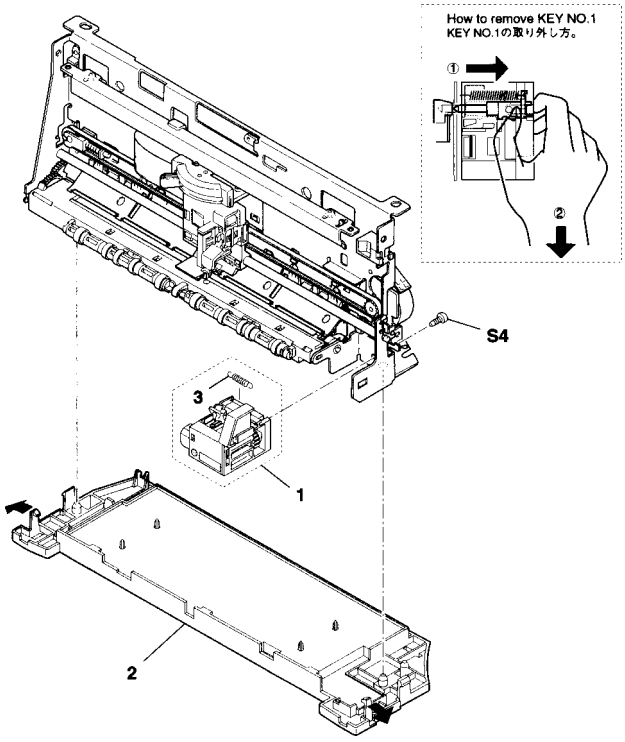
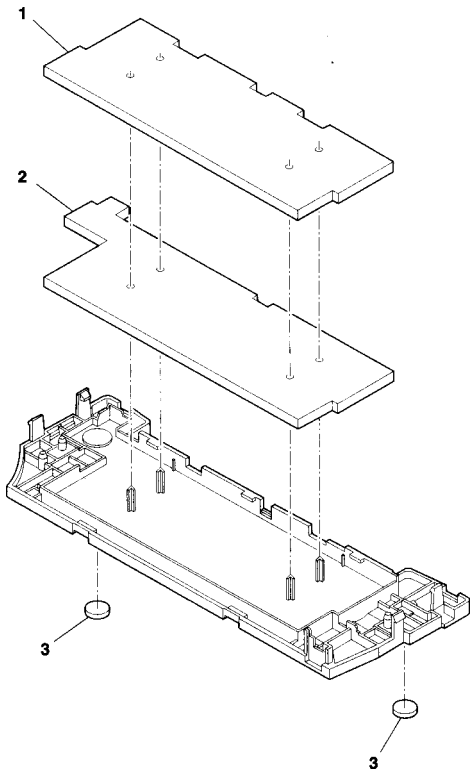
FIGURE 7 BOTTOM CASE & PURGE UNIT



NUM.	PART #	DESCRIPTION
7 - 1	QG5-0671-000	PURGE UNIT (W/SPRING)
2	QG5-0765-000	BOTTOM COVER UNIT (W/FOOT)
3	QB1-0467-000	SPRING HOOK END COIL

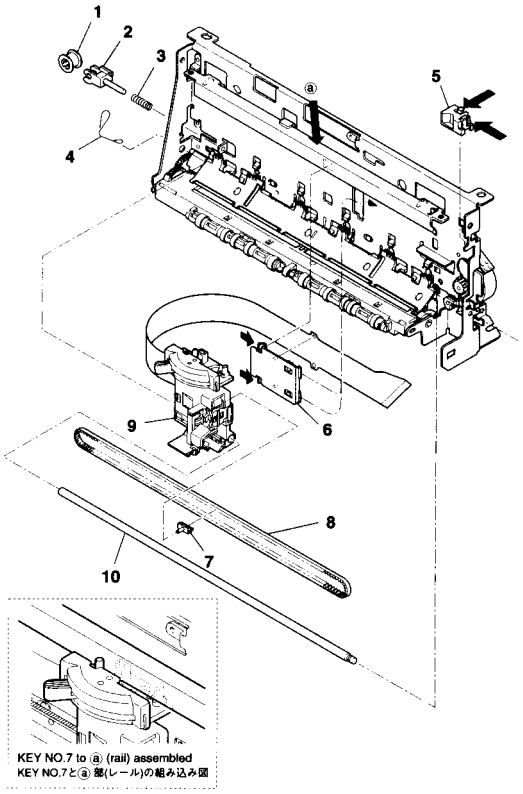
FIGURE 8 WASTE INK ABSORBER



NUM.	PART #	DESCRIPTION
8 - 1	QB1-2253-000	ABSORBER, INK, UPPER
2	QB1-2252-000	ABSORBER, INK, LOWER
3	QB1-0507-000	FOOT PRINTER

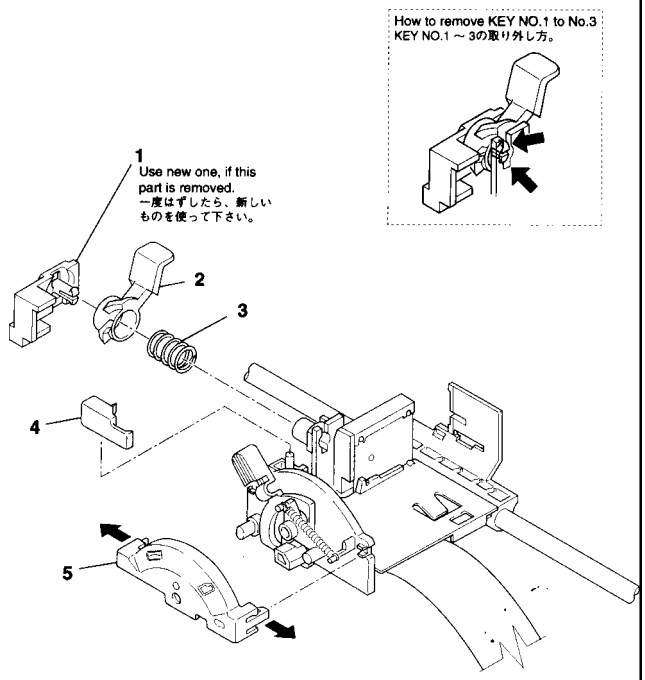
Canon

FIGURE 9 CARRIAGE PART (1)



NUM.	PART #	DESCRIPTION
9 - 1	QB1-0501-020	ROLLER IDLER
2	QB1-0502-000	BRACKET IDLER
3	QB1-0503-000	SPRING COIL
4	QB1-1229-000	CLIP SHAFT
5	QB1-0406-000	GUIDE CORNER
6	QB1-0497-000	HOLDER CARRIAGE RIBBON CABLE
7	QB1-2250-000	HOLDER, BELT
8	QB1-1260-000	BELT, CARRIAGE
9	QG5-0764-000	CARRIAGE UNIT
10	QB1-2048-000	SHAFT CARRIAGE

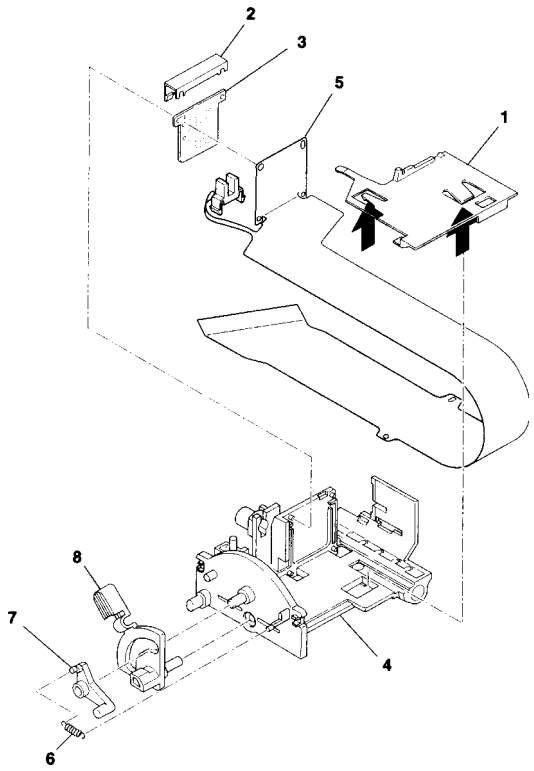
FIGURE 10 CARRIAGE PART (2)



NUM.	PART #	DESCRIPTION
10 - 1	QB1-0440-020	COVER HOOK
2	QB1-0437-000	LEVER HOOKING
3	QB1-0439-000	SPRING COIL
4	QB1-2027-000	HOOK CARRIAGE
5	QB1-2248-000	COVER CARRIAGE TOP

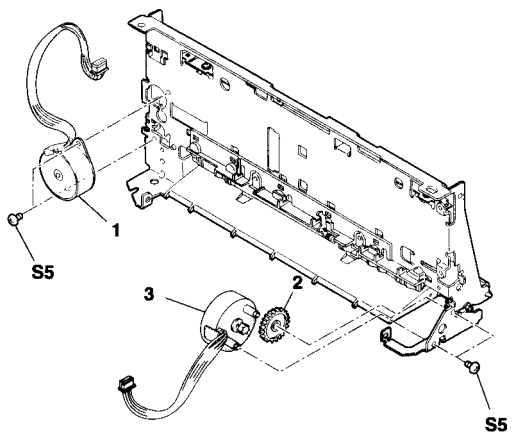
Canon

FIGURE 11 CARRIAGE PART (3)



NUM.	PART #	DESCRIPTION
11 - 1	QB1-0435-000	GUIDE RIBBON CABLE
2	QB1-0441-000	HOLDER RIBBON CABLE(UPPER)
3	QB1-2021-000	PAD CONTACT
4	QB1-2247-000	BASE CARRIAGE
5	QG2-2703-000	CARRIAGE RIBBON CABLE ASS'Y
6	QB1-0449-000	SPRING HOOK END COIL
7	QB1-0447-000	CAM TENSION
8	QB1-2249-000	LEVER FORMS THICKNESS

FIGURE 12 MOTORS



NUM.	PART #	DESCRIPTION
12 - 1	QH4-4112-000	MOTOR CARRIAGE
2	QB1-0500-000	GEAR SLOW DOWN
3	QH4-4114-000	MOTOR PAPER FEED

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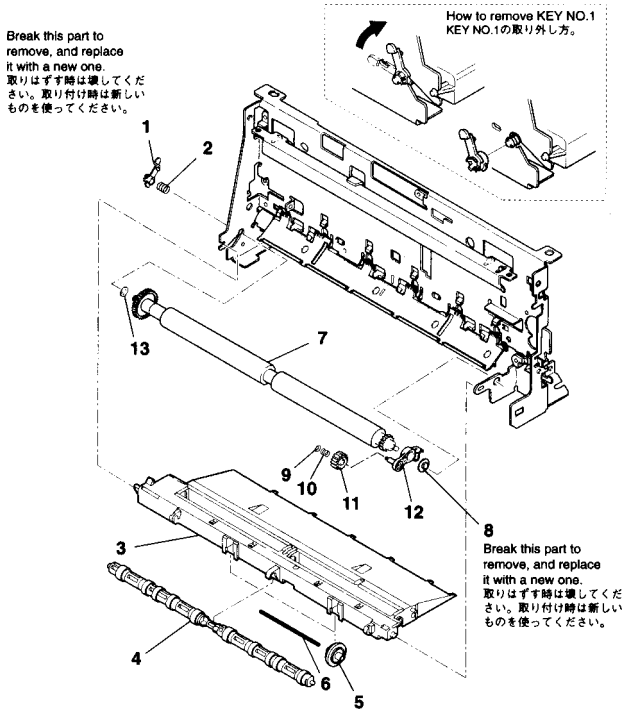
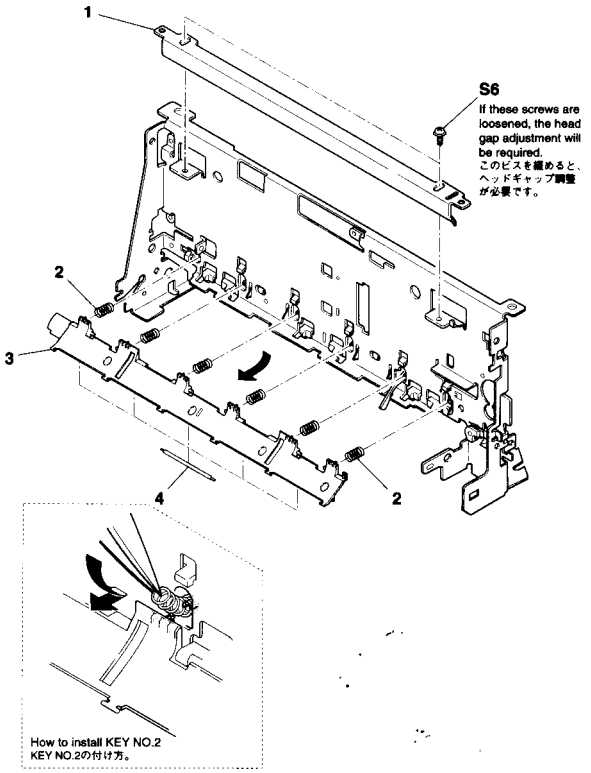
FIGURE 13 PAPER FEED PART (1)



NUM.	PART #	DESCRIPTION
13 - 1	QB1-0417-000	BUSHING
2	QB1-0423-000	SPRING COIL
3	QB1-2246-000	PLATEN
4	QB1-2028-000	ROLLER EJECT
5	QB1-2055-000	ROLLER TRANSMISSION
6	QB1-0419-000	SHAFT ROLLER
7	QF5-0280-000	FEED ROLLER ASS'Y
8	QB1-0422-000	BUSHING
9	XA9-0613-000	NUT, SUS
10	QB1-0421-000	SPRING COIL
11	QB1-0425-000	GEAR TRANSMISSION
12	QB1-0420-000	ARM TRANSMISSION
13	QB1-0622-000	WASHER PLAIN (S)

FIGURE 14 PAPER FEED PART (2)



NUM.	PART #	DESCRIPTION
14 - 1	QB1-0404-000	FRAME CARRIAGE GUIDE
2	QB1-0410-000	SPRING COIL
3	QB1-0409-000	PLATE PRESSURE
4	QB1-0684-000	ROLLER PRESSURE

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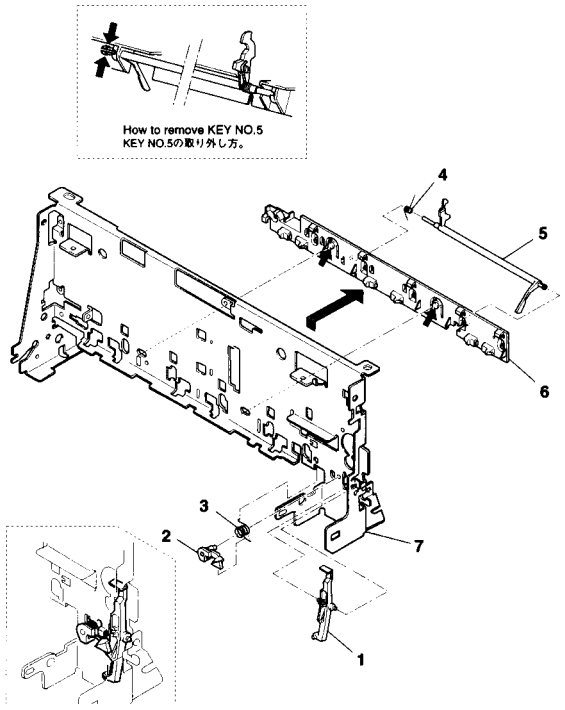
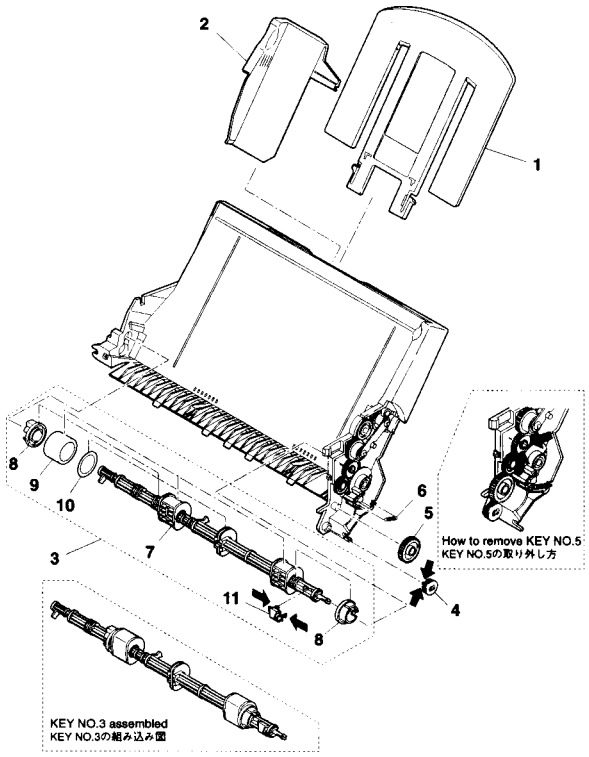
FIGURE 15 PRINTER FRAME



NUM.	PART #	DESCRIPTION
15 - 1	QB1-0413-000	ARM SENSOR
2	QB1-0414-000	HOOK CARRIAGE
3	QB1-0415-000	SPRING TORSION
4	QB1-0412-000	SPRING TORSION
5	QB1-0411-000	ARM PAPER SENSOR
6	QB1-2215-000	GUIDE PRESSURE PLATE
7	QB1-0403-000	FRAME PRINTER

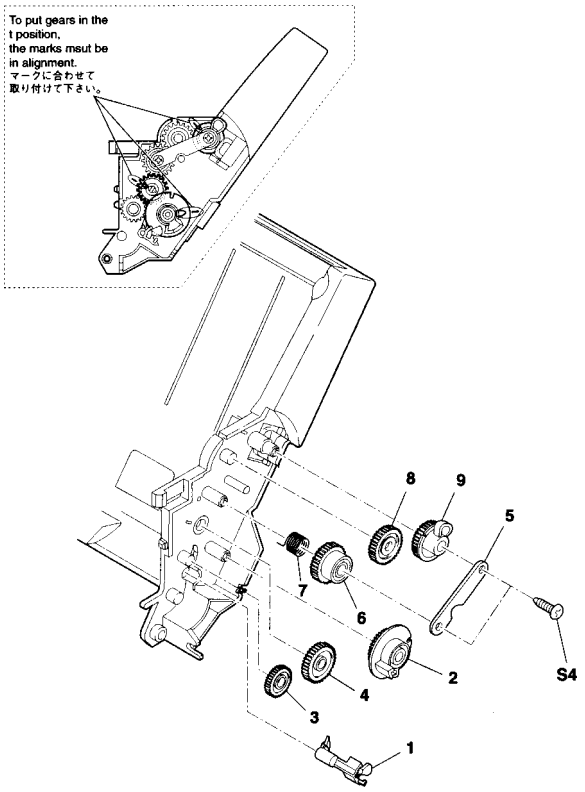
FIGURE 16 CUT SHEET FEEDER PART (1)



NUM.	PART #	DESCRIPTION
16 - 1	QB1-2217-000	SUPPORT, PAPER
2	QG5-2225-000	GUIDE, PAPER
3	QG5-0736-000	PICK-UP ROLLER UNIT
4	QB1-0485-000	GEAR, TRANSMISSION
5	QB1-0480-000	GEAR, TRANSMISSION
6	QB1-2194-000	COIL SPRING HOOK END
7	QB1-2196-000	SHAFT, PICK-UP ROLLER
8	QB1-2197-000	ROLLER, SLIP
9	QB1-2198-020	RING, RUBBER, PICK-UP
10	QB1-2231-000	RING, RUBBER
11	QB1-0433-000	PAPER GUIDE

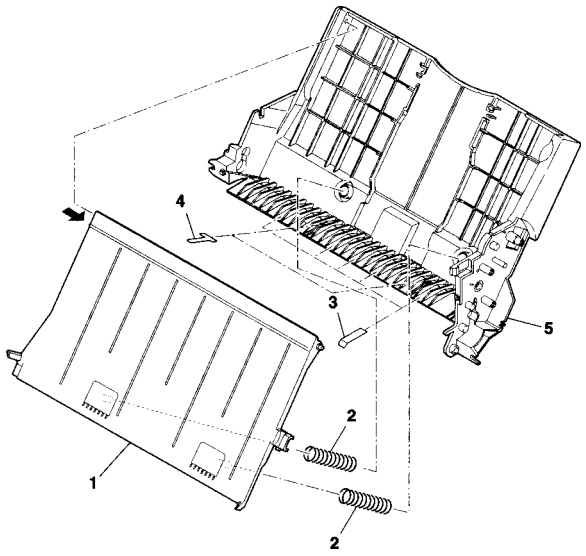
Canon

FIGURE 17 CUT SHEET FEEDER PART (2)



NUM.	PART #	DESCRIPTION
17 - 1	QB1-2191-000	SEPARATOR, PAPER
2	QB1-2192-000	GEAR, CONTROL
3	QB1-0479-000	GEAR, TRANSMISSION
4	QB1-2212-000	GEAR, PICK-UP ROLLER
5	QB1-2195-000	PLATE, GUIDE
6	QB1-0483-000	GEAR, ONE-WAY CLUTCH
7	QB1-0482-000	SPRING, ONE-WAY CLUTCH
8	QB1-0484-000	GEAR,TRANSMISSION
9	QB1-2193-000	GEAR, CAM

FIGURE 18 CUT SHEET FEEDER PART (3)



NUM.	PART #	DESCRIPTION
18 - 1	QF5-0265-000	PAPER LIFTING PLATE ASS'Y
2	QB1-0491-000	SPRING COIL
3	QB1-2230-000	SHEET, SUPPORT
4	QB1-1950-000	SHEET, MEDIA STOPPER
5		NOT AVAILABLE
6		NOT AVAILABLE
7	QB1-2189-000	FRAME ASF